Agriculture

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Cooper News

FARM BULLETIN published by COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
World famous Manufacturers of Sheep Dips, Worm Drenches and other Stock Remedies.

No. 51 PUBLISHED EVERY SECOND MONTH DECEMBER, 1956

New DIELDRIN DIPS

This season a full range of DIELDRIN DIPS is available from all leading Stock and Station Agents. The advantages of these dips are mainly for those Sheepowners who have to contend with the fly pest. Dieldrin dips are slightly more expensive than BHC ("Gammexane") or Arsenical powders but in bad fly areas the extra cost is far offset by the vastly prolonged fly control they give. They also provide complete control of keds and lice.

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1. No fly problem but complete kill of keds and lice required with maximum protection against reinfestation.
2. Some fly, not serious but again complete control of ked and lice required with maximum reinfestation protection.
3. Fly a serious menace—maximum protection against it required as well as complete and lasting control of keds and lice.

THERE IS A C.M.R. DIP FOR EVERY REQUIREMENT. WITH EACH A SINGLE DIPPING ONLY IS REQUIRED.

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1. No fly trouble so it is needless to pay extra to control fly. A "Gammexane" or Arsenical Powder Dip will give excellent results at economical cost.

2. Some fly, not serious, but again complete control of keds and lice required with maximum should be used. This provides complete ked and lice control plus, a minimum of 4 weeks "crutch" and 8 weeks "body" strike protection.

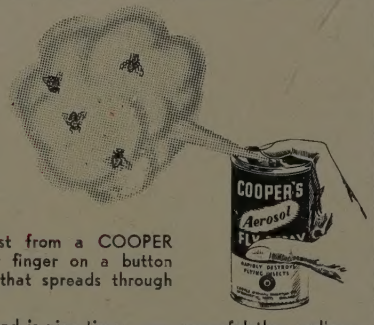
3. Maximum possible control of FLY as well as keds and lice is required and IS PROVIDED BY DIELDRIN FLUID FLY DIP. This sensational dip gives complete ked and lice control and also absolute freedom from fly for a *minimum* of 8-10 weeks "crutch" strike and a *minimum* of 14 weeks "body" strike. Partial fly protection goes on for up to 20 weeks.

SHOWER DIP OWNERS. There is a Dieldrin Shower Dip Fluid specially formulated for use in Showers. It is used at either of two concentrations depending on period of fly protection required. At 1-300 protection equal to Fluid Fly Dip is secured, at 1-600 shorter protection equal to Dieldrin Powder. At either concentration complete ked and lice control is provided.

Quite considerable publicity has lately been given to the new insecticides for fly control. Coopers have had ready access to ALL these insecticides. They have thoroughly evaluated them all by exhaustive research and extensive world wide field trials. Their researches have conclusively proved the advantages of DIELDRIN and they are proud to offer their outstanding new dips based on this remarkable insecticide.

DON'T EXPERIMENT — IT HAS ALREADY BEEN DONE — USE A COOPER, McDOUGALL & ROBERTSON DIELDRIN, "GAMMEXANE" OR ARSENICAL DIP THIS SEASON.

PUSH BUTTON WAR ON FLIES



Flies cannot escape the almost invisible mist from a COOPER HOUSEHOLD AEROSOL. The touch of your finger on a button automatically releases a cloud of insecticide that spreads through the room and blankets the pest.

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TRY COOPER'S DAIRY OINTMENT FOR YOURSELF!

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This Month's Cover

*The Mt. Cook lily (*Ranunculus lyalli*). one of the most beautiful of New Zealand's alpine plants, is the subject of this month's cover from a colour photograph by National Publicity Studios. The plant, however, is not a lily but a large, white buttercup. A native of the South Island it grows to perfection along the shady banks of mountain streams and in moist hollows sheltered by the sub-alpine scrub of the Southern Alps, particularly between 2000ft. and 4000ft. In summer its numerous, waxy-white, anemone-like flowers lighten and diversify the dark, sombre face of the scrub, their profusion forming a garden whose natural beauty might easily put to shame the stately flower ranks and geometrical beds of many a formal garden.*

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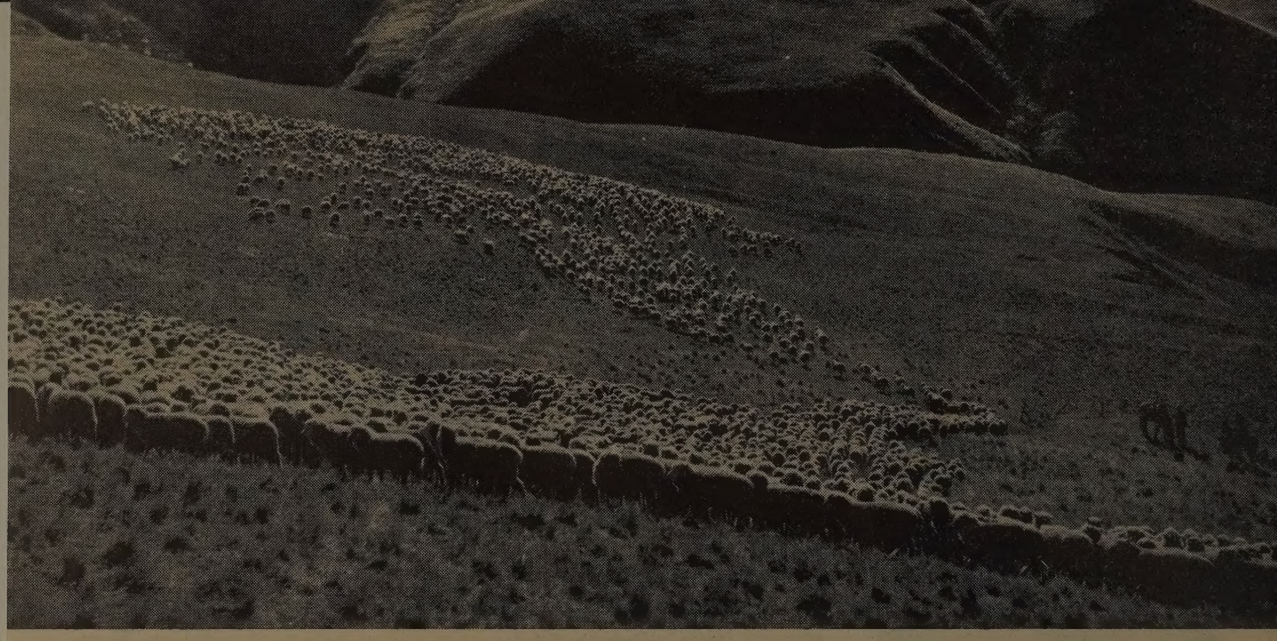


Control of Sheep Lice, Keds, and Fly Strike

By G. R. MACKINTOSH,
Livestock Instructor, Department of Agriculture, Hamilton

WITHIN the last decade or two a great improvement in all aspects of animal husbandry has been seen. The farmer has demonstrated his ability and keenness to apply new methods and this has resulted in more efficient farming and a higher per acre production. In the control of external parasites of sheep (lice, keds, and sheep blowfly) equally great advances have been made. With the insecticides available to the farmer today control of all these parasites should be easy. In fact under paddock conditions both keds and lice should be eradicated. In contrast, however, progress in the over-all control of these parasites is slow, and there are individual farms and groups of farms on which the position has deteriorated.

IT would appear that farmers are not conversant with correct control procedure. Even among more experienced farmers there is room for much greater efficiency and these notes are compiled to assist farmers toward a better appreciation of the problem.

The body louse, or "biting louse" as it is sometimes referred to, causes more unthriftiness than other skin parasites. It is not a blood sucker as is commonly believed, but lives on the debris on the sheep's skin. Its biting causes such severe irritation that the animal's grazing behaviour is affected to such an extent that it is very restless or even mopes about and does little grazing.

Sheep biting themselves or rubbing on fences, posts, or other objects commonly indicate lousiness. Incidentally, sheep that occasionally rub on objects are not necessarily lice infested; other factors sometimes cause skin irritation. With a heavy infestation the usual symptoms may or may not be more noticeable, but the effects on the thriftiness of the animal are always correspondingly greater. From egg to egg the life cycle is 34 days. It is possible under favourable conditions for these parasites to survive a day or two away from the sheep. Very few, if any, however, will survive more than 5 days away from their host.

The sheep ked (sheep tick as it is commonly but incorrectly termed) has always been present in flocks, but of recent years its relation to the incidence of body lice is not as great as it was. The ked is much larger and more easily seen than the louse.

The leg louse to a much less extent has also been in flocks for many years and is almost solely confined to the legs of sheep. It is dark blue and is associated with a characteristic offensive smell. It causes little, if any, inconvenience to its host. In the past sheep dipping materials at ordinary strength have not been very effective against it. Usually only odd cases are found and the owner effectively deals with these by hand dressing with concentrated dipping materials or perhaps even with a little kerosene.

The sheep face louse (*Linognathus ovillus*) is fortunately not known in New Zealand.

Seasonal Fluctuation

The degree of infestation by these skin parasites on sheep shows a distinct seasonal fluctuation. It is at a very low level during summer, increasing during late autumn and winter, and reaching the highest incidence during late winter and early spring, after which to some extent the parasites diminish in numbers until autumn.

During summer, infestation is carried on by a small number of individuals. These "seed" infestations are often small and sometimes only affect a few sheep in a flock, so that in such circumstances a thorough search of many sheep has often to be made before the parasites are found.

It is important, however, for owners to remember that sheep can often be slightly infested with lice or keds without showing outward symptoms. A competent sheepman should be able to examine his sheep for lice or ked infestation just as Departmental officers do at saleyards. In fact, there is a considerable need for owners to

HEADING PHOTOGRAPH: Sheep being turned out after dipping at west Wanaka. National Publicity photograph.

do this, and a great deal of annoyance and regret would be avoided if it was common practice.

The source of lice or ked infestation is contact with an infested sheep. Small residual infestations following inefficient dipping, failure to secure a full muster for dipping, and failure to dip rams all can explain why some flocks continue to remain infested.

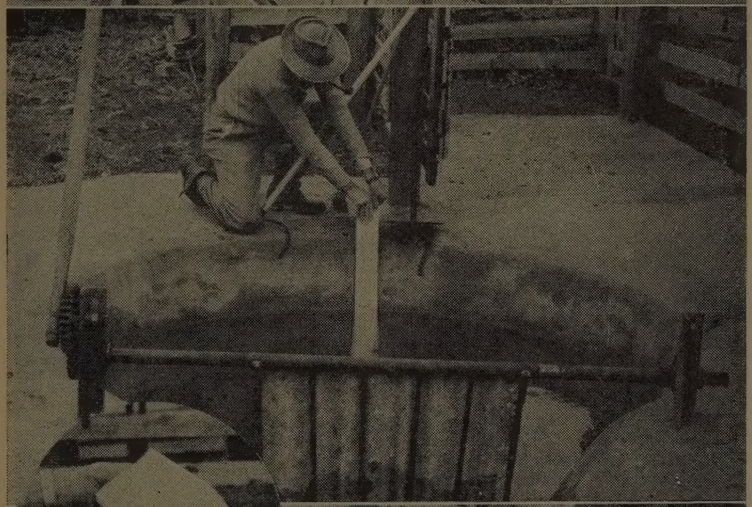
Unlike fleas, all lice are host specific. Goat lice are very similar in appearance to sheep lice, but will not live on sheep. To prove this research workers at the Department of Agriculture's Animal Research Station, Wallaceville, used a vacuum cleaner to suck large numbers of body lice from a goat, and then by reversing the apparatus had these blown on to the skin of a clean sheep. Within 48 hours none remained. Condition or

Dipping facilities prepared. A pot dip built by a Huntly farmer who changed from dairy to sheep farming.

bodily health has little to do with skin infestation. Very poor-conditioned or very fat sheep can be equally affected. Again, very poor sheep do not "breed" lice any more than putrefying meat spontaneously produces maggots as was formerly believed.

Fly Strike

Fly strike in many respects is a tougher problem. Only two types of fly are responsible for the primary strike in New Zealand. One is brown and the other is a small, bronze-green type. Various efficient proprietary and other chemical preparations are available with which to treat sheep which have been struck. These preparations kill the maggots, assist healing, and prevent restrike. Kerosene, carbolic dips, Stockholm tar, etc., are

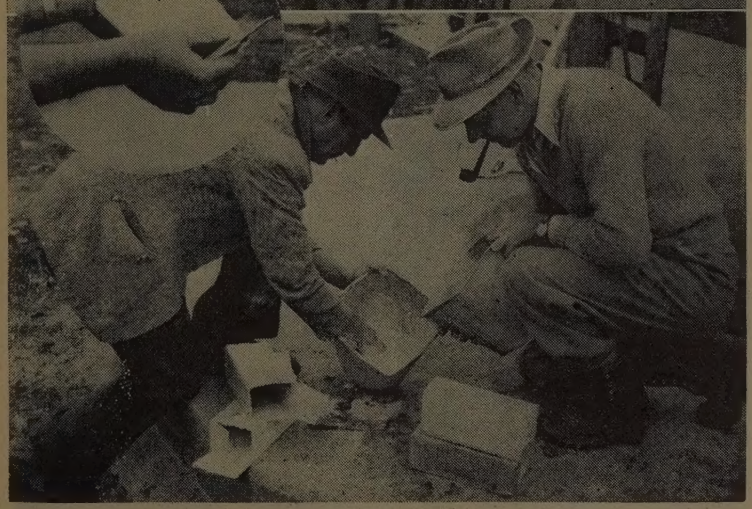


It is most essential that the bath capacity be accurately calibrated. This dip holds 800 gallons of wash.

not efficient and Stockholm tar in particular can be harmful to wool. Prevention is much more important. Docking the tail too short should be avoided. To obtain the maximum protection against crutch strike in ewes the tail should be cut at a level which will bring the tip about ¼in. to ½in. below the tip of the lamb's vulva.

More effective prevention still follows the jetting or dipping of sheep in dieldrin or aldrin. With this treatment 1 month's to 3 months' protection is given according to the concentration of dip.

Throughout recorded history, and no doubt before, man has endeavoured to protect his flocks from the depreda-



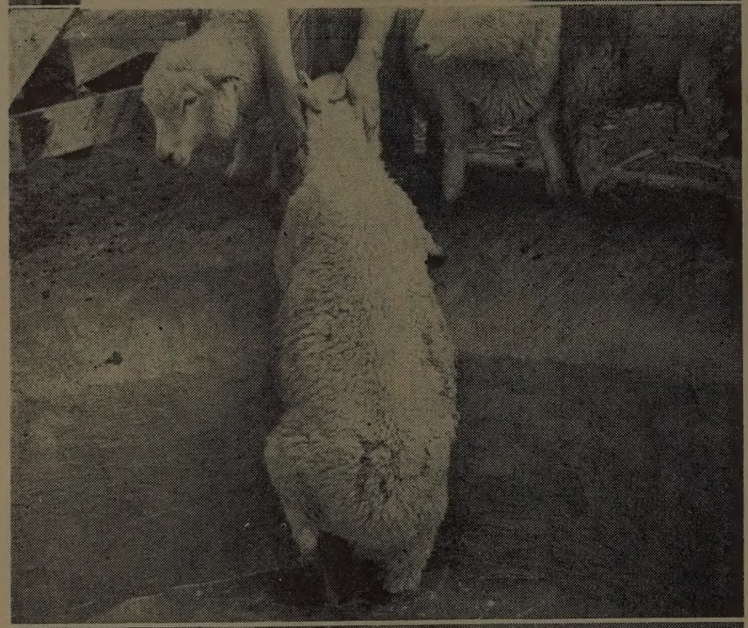
Mixing BHC insecticide according to directions on packet. Inset—Carefully read the mixing instructions on container.

tions of these and allied skin parasites. The primitive shepherd was able to give more attention to each of his charges, but the vegetable concoctions and oils he used were of little value, and certainly were not to be compared with the synthetic chemicals such as the very efficient aldrin and dieldrin evolved during recent years.

History of Dipping

Recorded data as far back as 200 B.C. are reminders of the continual

← Plunging is important.



fight by man against the ectoparasites that would cause so much damage to his flocks. As he found it necessary to take determined measures with the limited materials at his disposal so the modern farmer must do likewise.

It was not until about 1840 that chemicals giving a substantial degree of efficiency were developed in the form of arsenical compounds. The residual toxicity, that is, the period of protection following immersion, of arsenic was not great, and with young keds emerging from the pupae after 22 days it was not entirely effective. There was also the danger of extensive poisoning of stock with this dipping material.

Phenol was used for many years, usually with other materials, but has now been to a great extent discarded. Bloom dips were mainly composed of this material because it enhanced the appearance of the wool and left it

← It is better for a sheep to enter the bath this way rather than head first.

softer to the feel. The "straight" phenolic dip, as with a "straight" derris dip, did not possess sufficient residual effect to destroy lice nits or the young keds as they emerged.

DDT was found to be effective against lice and keds and gave short-duration protection against fly strike. It was, however, more costly than other insecticides.

Benzene hexachloride (BHC) was introduced in 1948, and under test in several countries proved superior to all previous insecticides. It was non-poisonous, generally cheaper, and could be readily mixed in hard or soft water as well as possessing a greater lasting effect in the wool.

When the manufacturer's instructions were understood and properly carried out the residual effect of dipping with BHC was sufficient to destroy the eggs of keds and the

← Total immersion of each sheep is also essential.

young lice as they subsequently emerged. At normal dipping strength it did not give much, if any, protection against fly strike.

Early difficulties following cases of sheep lameness were overcome by the addition of a bacteriostat. In all instances where complaints as to the efficiency of this material were investigated it was found that the mixing technique was faulty. The most common mistake, possibly due to a lack of clarity, was the failure of users to understand the instructions and the necessity to reinforce as well as replenish the dip wash during dipping.

"Stripping" of Dip

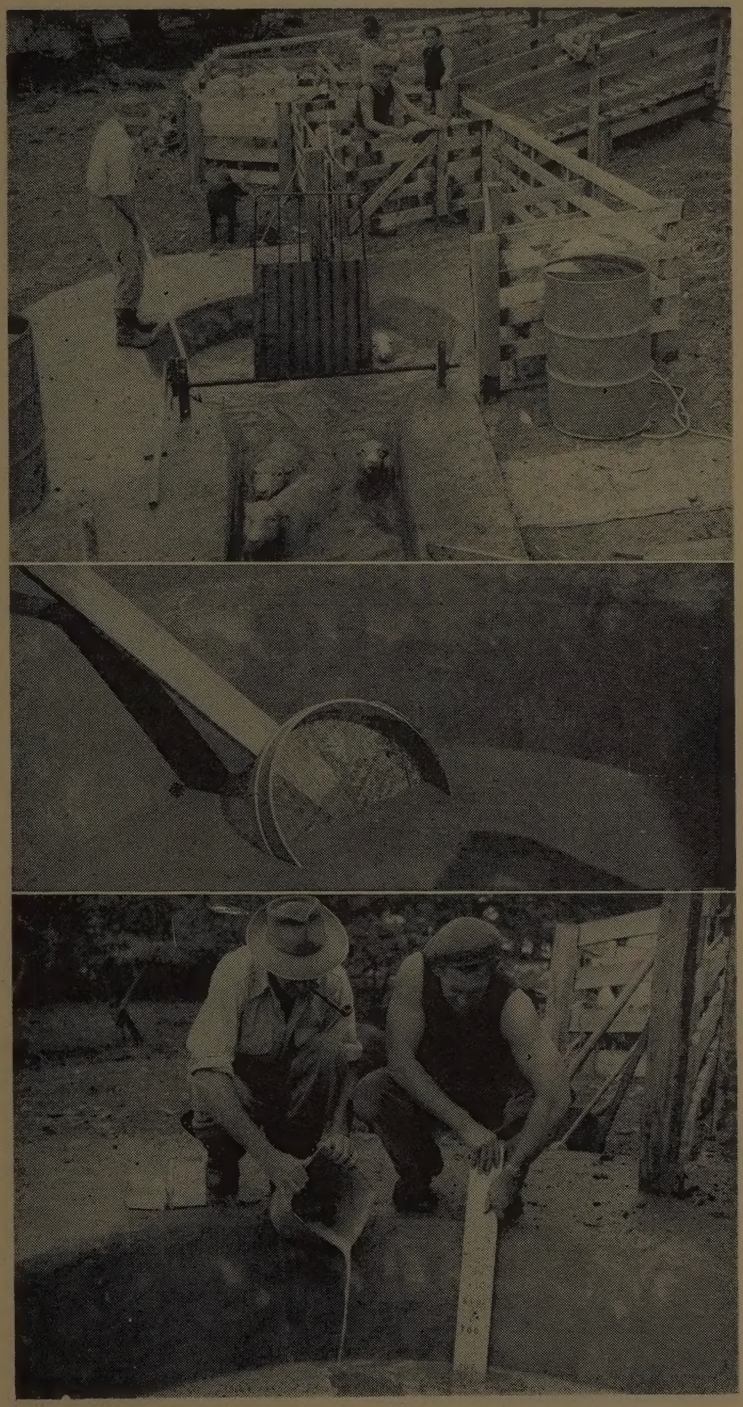
As each sheep passes through the dip wash its wool strains out and retains the dip particles to a greater extent than it takes out the water, so that as the dipping progresses the wash becomes gradually weaker. The weakening of the dip wash due to this straining out of the minute particles of ingredients is known as "stripping".

This stripping more commonly occurs when a small volume of fluid is used to treat a large number of sheep as in a shower spray or small capacity bath. It is therefore usually necessary to add a half packet of dip mixed with a little water, according to instructions of manufacturers, as soon as the total gallonage of the dip drops by 200 gallons.

When the dip bath has to be replenished, that is, partially refilled, a further half packet has to be used for each 200 gallons of water that has been lost in addition to the normal requirement of one packet for every 200 gallons of water added.

It is important that farmers who continue to use BHC dips should clearly understand and follow these essential requirements. An extra packet can be added if in doubt, because even at 10 times the recommended strength benzene hexachloride is perfectly safe.

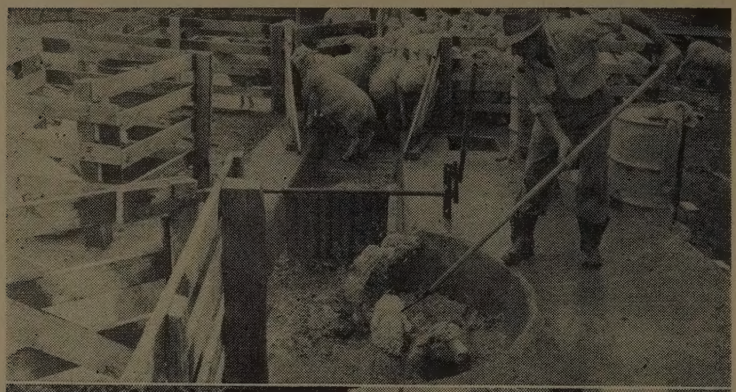
Farmers who will be using the new dieldrin or aldrin insecticides should also understand and follow this essential requirement of **reinforcing** as well as replenishing, because these insecticides also exhaust or strip in the same way as other dips. It is neces-



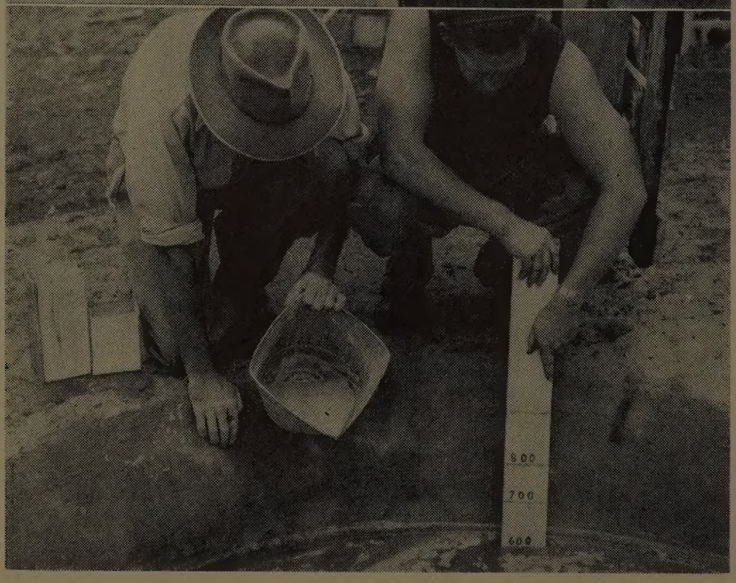
Allow dipped sheep to leave bath before others are put in. (Incidentally in Great Britain the law requires the presence of a policeman at each annual dipping.)

Calibration board and sand sieve used to remove scum from wash.

The bath has dropped by 200 gallons to the 600-gallon level and the wash is being reinforced with insecticide only to restore the strength of the wash. As with BHC dips this reinforcement is also necessary with the new dieldrin and aldrin insecticides.



After reinforcement of the wash dipping continues.



Calibration board (inset) shows that wash level has fallen to 400 gallons. Four hundred gallons of wash is insufficient to dip remaining sheep, so owner must replenish by adding an extra 200 gallons of water.

Half a packet is again necessary to reinforce the wash, plus one full packet required for the replenishment with 200 gallons of extra water.

sary to remember that all dips become exhausted and require reinforcement in addition to the usual replenishment of the dip wash at the strength recommended by the directions.

Dieldrin and aldrin are synthetic chemicals developed from by-products of the petroleum industry. Dieldrin and aldrin are not only efficient insecticides but both remain on the skin for longer periods than any other dipping material previously used. Above all, these provide prolonged protection against fly strike damage.

Research has shown that one of the reasons why both dieldrin and aldrin give more prolonged protection is that unlike DDT they have the property of diffusing down the wool fibre on to the skin surface. These latest insecticides therefore maintain on the skin surface a concentration lethal to maggots as they emerge from the eggs. Incidentally, shower dipping may be somewhat more effective when used with dieldrin or aldrin wash in comparison with the results formerly obtained by such spraying plants when BHC or other dipping chemicals were used.

As wool grows approximately $\frac{1}{4}$in. every month, it follows that after 3 months the treated portion would be at least $\frac{3}{4}$in. from the skin surface, so that this diffusion partly explains the prolonged protection afforded by these insecticides.

Though dieldrin diffuses more slowly than aldrin, its toxic effect on maggots at similar strength is greater. Dieldrin also is less volatile than aldrin and thus has the advantage of a longer residual action than the latter, according to research undertaken by South African workers. The minimum protection given by dieldrin used at the usual dipping strength of 0.05 per cent. concentration is 14 weeks against body strike and 8 to 10 weeks against crutch strike, but in practice the periods of protection are generally much longer.

Dieldrin and aldrin powder dips at present on the market should be used at one packet to 200 gallons of water to give a wash concentration of 0.05 per cent. Dieldrin fluid dips should be used at 1 gallon of concentrate to 200 gallons of water to give a wash concentration of 0.05 per cent. Under intense fly activity and for prolonged blowfly control aldrin should be used

at one packet to 100 gallons to give a 0.1 per cent. concentration. Both dieldrin and aldrin can be obtained in powder or fluid form.

Dieldrin and aldrin dips are poisonous, but at diluted dipping strength are as safe to use as any other type of dip. Ewes in milk with lambs can be safely dipped in dieldrin or aldrin wash at the usual dipping strengths. It is always better to draft the lambs from the ewes and dip them separately. If unweaned, the lambs should not be returned to the ewes until about an hour after they are dipped.

Experimental trials in the jetting (saturation of the treated areas) of sheep with dieldrin and aldrin as a protection against fly strike were conducted by research workers in Australia.

The trials were undertaken with each insecticide at equivalent concentrations. Live maggots were used and implanted in the wool at regular intervals. The tables quoted on page 541 are from a paper, "The Value of DDT, BHC, Aldrin, and Dieldrin for the Protection of Sheep against Body Strike", by J. H. Riches and P. J. O'Sullivan, published in the "Australian Veterinary Journal", October 1955.

Trials 1 and 2 indicated that dieldrin is more effective than aldrin when sheep are treated by jetting.

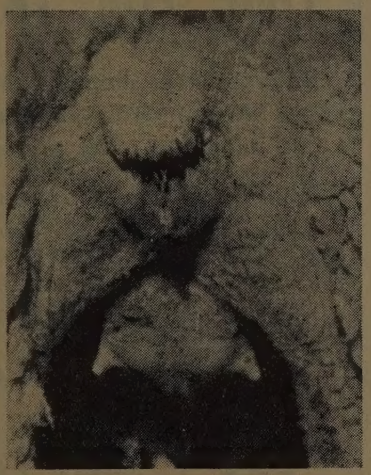
Dieldrin and aldrin can be regarded as "double-purpose" sheep dips in that both the control of keds and lice together with some months' protection against fly strike damage can be accomplished solely with one dipping. The great advantage over other insecticides in reducing losses and saving labour, particularly to the hill country farmer, is obvious. If the primitive sheep owner, or even the pioneer settlers who eliminated sheep scab over half a century before sheep owners of any other country, had had the latest chemical insecticides at their disposal, there would not be a ked or lice problem in flocks today.

Best Time to Dip

What is the best time to dip sheep? This is a question often asked. When it is considered that most of the parasites in the fleece are removed by shearing and that the few which remain have very little protection on the almost bare skin it will be readily realised that the best results will be obtained from dipping as soon as possible after shearing.

However, it is important to remember that there is always the possibility of infection of shear cuts, so that a safer policy is to allow at least a fortnight after shearing for any cuts to heal before beginning dipping operations. There is no bacteriocide of sufficient strength capable of destroying blood poisoning organisms which sometimes get into a dip wash. An instance was recently recorded in Australia where 1200 sheep in a flock of 10,000 died of blood poisoning due to bacterial contamination of shear-cut wounds following dipping immediately after shearing.

Dipping again proceeds. The modern insecticides BHC, dieldrin, or aldrin are not dissolvents, so that reinforcement as well as replenishment of wash is most essential.



A ewe which has been docked too short. The incidence of crutch strike is generally lower where sheep have been so docked that the end of the tail stub reaches just below the tip of the vulva.

Owners when considering the purchase of any brand of dip offered for sale as suitable for shower dipping plants should consider whether the bacteriostat incorporated in it is copper sulphate (bluestone), because this chemical, though a first-class bacteriostat, could play havoc with the ferrous metal fitments of any shower plant.

The essentials in the over-all seasonal dipping operations are common knowledge to most owners, but their reiteration is worth while even to some of the experienced sheepmen:—

1. Endeavour to co-operate with neighbours by dipping about the same time if possible. Stray sheep are thus less likely to be returned undipped and so reinfest the flock. Mustering the day before dipping is desirable. "Straggle" muster if there is a likelihood of odd sheep having been missed.

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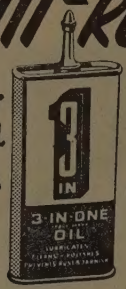

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2. Prepare by having the dip bath thoroughly cleaned out so as to avoid filth and infection. Have all gear in readiness.
3. Read instructions on packet carefully and mix accordingly after measuring correct gallonage of dip bath.
4. Plunge the wash thoroughly. Dip all sheep on the property, including rams, lambs, stragglers, and "killers" for home mutton or dog tucker.
5. Do not dip hot, tired, and thirsty sheep.
6. Handle sheep carefully. Dipping should never be hurried. Ensure total and thorough saturation whether in bath or spray enclosure. Examine sheep at intervals to make sure that the wool has been saturated right to the skin. Never "duck" a sheep that is coughing.
7. Do not dip sheep in wet weather, very cold windy weather, or so late in the day that they cannot dry out before sunset.
8. Do not crowd too tightly in draining pens, especially on a very hot day. Allow sheep to rest, preferably in the shade, before being driven away.

Every year young children are drowned by falling into uncovered dip baths. Remember that before removing dripping sheep in the draining pen, cover the dip. Recently two such tragedies have occurred.

More efficient control of skin parasites in sheep in New Zealand would, in general, be determined by three main factors. These are, first, the efficiency of the chemical material used; secondly, the attitude of individual sheep owners and farmers' organisations to this problem; and, thirdly, the effectiveness of the law and the efficiency of the administrative techniques to enforce compulsory dipping and in dealing with sheep lice and ked infestation.

First, it is evident that the research chemists have undoubtedly played their part in the development of the modern insecticides such as BHC and more particularly dieldrin and aldrin. Any failure to deal with this problem cannot be laid at their door.

Secondly, the attitude of owners, individually and collectively, dominates and substantially determines whether and to what extent this country can expect to advance in the elimination of this problem. With the unprecedented and amazing protection against lice and keds now available with the latest insecticides there should be much less excuse in the future for those owners who expose infested sheep in the saleyards.

Thirdly, the importance of up-to-date legislation as a factor in controlling lice and keds of sheep is fully appreciated by the Department of Agriculture. However, the maintenance of clean, healthy flocks still remains the responsibility of the stock owner and he must play his full part, irrespective of regulations, if the results are to be fully satisfactory.

A democracy works best when everyone takes an intelligent interest in those things of which they have some knowledge and personal concern.

History of Dipping

200 B.C. (approximately) to 1534

(Treatments, in the main, of little value)

200 B.C. (approximately): Lees of oil and wine plus a decoction of lupin and water were applied by hand to skin of sheep after shearing.

A.D. to Middle Ages: Virgil, the Roman historian, records hand dressing of scabby sheep with ointments of bitter oil lees, spume and silver, native sulphur, India pitch, etc., and immersion in river.

14th and 15th centuries: Salving of scabby sheep with tar mixed with oil or with mercurial ointment became the standard treatment.

1534: Sheep's suet, stale urine, and brine added to a jellied concoction of boiled leaves and flowers after straining were applied to sheep.

18th Century

(Possibly some little improvement)

Infusions or decoctions of tobacco.

19th Century

About 1810 dips proved dangerous. Deaths from arsenical poisoning were frequent. Crude arsenical solutions plus sulphate of iron. Bitter substances (gentian root and bitters) were added to stop the sheep drinking the dip.

In 1843 William Cooper invented the arsenic powder dips. These soon came to be used throughout the world until the second decade of the 20th century. They controlled lice almost completely and gave reasonably good control of keds.

Latter half of 19th century: Introduction of coal tar, creosote, and carbolic dips. These controlled adult lice and keds, but did not control ked pupae or lice nits. Incidentally straight carbolic dips **will not control lice and should not be used** for this purpose.

20th Century

About 1920 arsenical sulphur-derris powder dips came into use. Improved ked and lice control obtained with improved wetting and spreading agents and with easier mixing and better penetration. **Some** blowfly control was obtained.

In 1947 benzene hexachloride (BHC) dips were introduced. They gave **complete** control of keds and lice, but there was post-dipping lameness.

In 1948 BHC dips containing bacteriostat came into use. They gave complete control of keds and lice with **no lameness.**

In 1955-56 aldrin and dieldrin dips were introduced and gave complete control of keds and lice and gave prolonged blowfly control.

TRIAL 1—HIGHER THAN RECOMMENDED CONCENTRATIONS

(Aldrin and dieldrin used at concentrations of 0.25 per cent. and 0.1 per cent.)

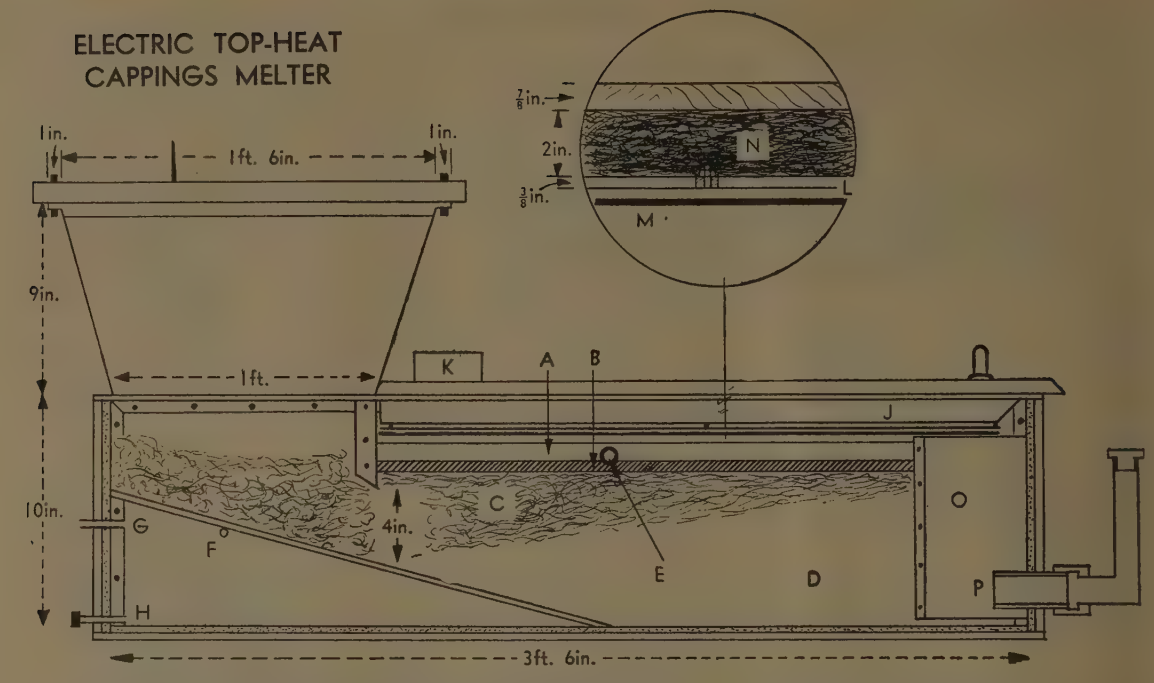
	Percentage "strikes" on sheep in trial				
	Aldrin solution		Dieldrin solution		
Weeks after treatment	at 0.25 per cent. strength	at 0.1 per cent. strength	at 0.25 per cent. strength	at 0.1 per cent. strength	Controls
7	0	0	0	0	83
8	8	0	0	0	100
10	8	8	0	0	100
11	8	8	0	0	100
12	8	8	8	0	100

TRIAL 2—LOWER AND ECONOMIC CONCENTRATIONS

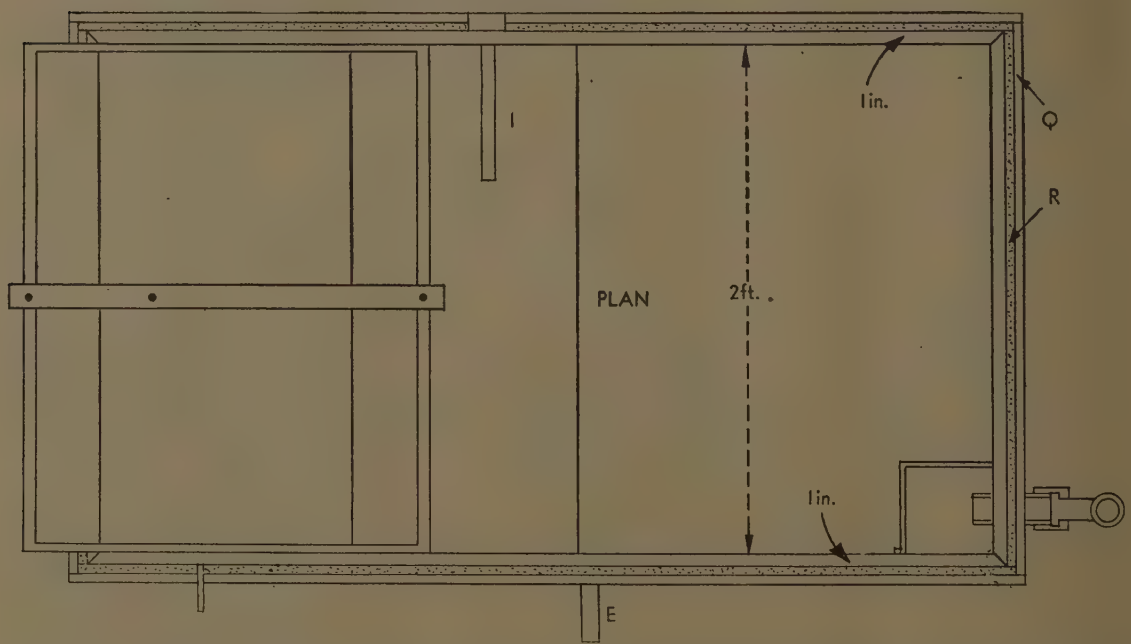
(Aldrin and dieldrin used at concentrations of 0.05 per cent., 0.02 per cent., and 0.01 per cent.)

	Percentage "strikes" on sheep in trial						
	Aldrin			Dieldrin			
Weeks after treatment	0.05 per cent.	0.02 per cent.	0.01 per cent.	0.05 per cent.	0.02 per cent.	0.01 per cent.	Controls
6	0	22	33	0	0	0	78
7	11	44	44	0	0	33	100
8	33	44	78	0	0	78	100
9	33	44	100	0	33	78	100

ELECTRIC TOP-HEAT CAPPINGS MELTER



ELEVATION



A—Melted wax. B—Slum. C—Rising cappings. D—Honey. E—Wax outlet. F—Exhaust steam from uncapping knife. G—Air vent. H—Drain plug. I—Thermostat. J—Insulated heating cover. K—Covered power point from thermostat. L—$\frac{3}{8}$in. wire mesh screen for attaching heating cable. M—Heating cable. N—Glass wool insulation. O—Baffle. P—Honey outlet. Q—$\frac{3}{4}$in. dressed timber. R—$\frac{1}{8}$in. fibre board.

Electric Top-heat Cappings Melter

By L. A. GRIFFIN,
Apiary Instructor, Department of Agriculture, Christchurch

THE increasing use of a mineral-insulated or copper-sheathed heating cable in honey house equipment has in recent years overcome many of the problems that confronted beekeepers in the past. Many have had the idea of adapting the new heating cable for a cappings melter, but this presented certain difficulties. However, Mr. W. J. C. Ashcroft, of Hawke's Bay, was sufficiently interested to try to adapt the cable to cappings melting and he produced the practical melter described here. It has given excellent results and in many ways is an improvement on most types of melters now in use. The melter, which has been tested over 4 years, has been a complete success and is now used by other beekeepers in Hawke's Bay and Wairarapa. Being totally enclosed, except for the hopper, it has a clean, hygienic appearance when in operation. Construction is not difficult and operating costs are low.

THE processing of cappings has always been a problem where a large crop of honey is handled. Of the two methods used, one converts the cappings as they are taken off the combs, enabling the operator to have honey and wax in their separate classes at the finish of a day's extracting without further attention. The second method entails the processing of the cappings after extracting has finished. This is done either by melting the cappings in an oven to separate the honey and wax or by the use of a cappings press.

Most cappings melters, with the exception of the top-heat type, have one bad fault: The honey that passes through the melter is heated to the same temperature, or slightly above, that of the melting point of beeswax, between 145 and 150 degrees F.

Most honeys can be subjected to this temperature for a short period without appreciable deterioration, but there is a definite deterioration where honey, wax, and slum mix at these temperatures, even for a short period. Darkening of the honey is often very apparent, and the slum imparts a peculiar flavour to the honey as those who have used these melters well know.

Slum is normally composed of pollen grains removed with the cappings, a small quantity of propolis scraped from the frames while combs are being uncapped and, possibly the main constituent where combs have contained brood, the outer edges of the cocoon-lined cells of the combs.

Where white combs only are used in the extracting supers the problem is not so acute, as there is only pollen and possibly a small amount of propolis to contend with, but few producers have only white combs.

Various manipulations on the hives during the season usually result in some combs that have contained brood being lifted up to the supers and removed at the end of the season for extracting. Therefore, to prevent deterioration of the honey, the most efficient cappings melter is the type that separates the honey from the cappings before the cappings are subjected to melting heat, with no possibility of the honey either mixing with or falling through a layer of slum.

These essential points were all incorporated in the "Brands" cappings melter which has been in use for many years. The melter made by Mr. Ashcroft is similar in construction, but larger. The steam-heated tube grid for melting the cappings has been dispensed with in favour of the electric heating cable. This is incorporated in the cover and does not come in contact with either the wax or cappings in the tank.

As the whole top of the melter, except the hopper, is covered in to retain the heat, it is necessary to heat only the top 1½in. of space above the rising cappings. The baffle plate, which is a part of the hopper, extends down below wax and slum level in the tank, preventing the escape of heat by way of the hopper.

Construction of Tank and Hopper

Tank and hopper follow the usual design for the top-heat type of melter.

The dimensions of the tank are 3ft. 6in. long x 2ft. wide x 10in. deep, with 1in. galvanised angle iron riveted round the top edge to give strength and rigidity.

A false bottom (as shown in the diagram) is riveted and soldered in at the hopper end of the tank 6in. up from the bottom and extending diagonally to just over half way along the tank bottom. This provides a heated surface for the cappings to slide on and to warm the honey to enable the cappings to rise more rapidly to the surface. It also provides a container for the condensed exhaust steam from the uncapping knife or plane. Three copper pipes of the required length are soldered into this compartment, F to take the exhaust steam from the uncapping knife, G for a vent, and H for a drain plug to empty the compartment of water. This is fitted at the bottom corner.

Mr. Ashcroft preferred to have the main tank made from tinned steel, with a separate copper wedge-shaped tank that could be slipped in from the hopper end under the sloping bottom. If the warming tank for the exhaust steam is built in as shown in the diagram, the whole unit must be constructed from tinned copper to prevent rusting.

The hopper is made from tinned steel with one side of the hopper extending down to 4in. from the sloping bottom. This is riveted and soldered inside the tank at this end.

A wooden bar with centre pin for supporting the combs while they are being uncapped is bolted across the top of the hopper.

The honey outlet is fitted at the opposite end of the tank to the hopper and close to the bottom, with a baffle plate round it to keep cappings and wax clear of the outlet. The baffle must just clear the heating cable when the cover is in position and extend down to ⅛in. from the bottom of the tank.

The movable elbow assembly is of the usual pattern and is fitted to the outlet pipe with a gland nut to allow rotary movement either way for regulating honey and wax levels in the tank.

The wax outlet E must be fitted at the correct level. The bottom of the outlet pipe should be 1½in. below the heating cable when the completed cover is in position.

The 200 degree hot-water-type thermostat I (see plan) is fitted into the tank just above wax level. To ensure that levels are correct both the thermostat and wax outlet can be fitted after the cover is made to obviate any slight difference in cover measurements.

The honey and wax outlets and thermostat can be fitted at either side of the tank to suit working conditions or honey house layout.

It is advisable to set the tank in an insulated case made from §in. dressed timber lined with §in. fibre board. Allowance must be made for the extra length required when fitting the honey and wax outlets, etc.

Construction of Insulated Cover

The insulated cover J should be made as light as possible for ease of handling. An all-metal cover on a metal framework has proved too heavy. Normally the cover has to be removed only at the end of a day's extracting to take out the slum.

ELECTRIC TOP-HEAT CAPPINGS MELTER

The insulated heating cover.

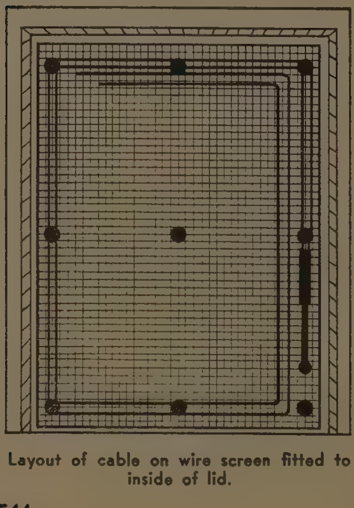
The cover shown in the diagram above has a ⅞in. wood top of the same dimensions as the outer measurements of the insulated casing round the tank and is bevelled at one end so that it fits close against the hopper. The cover must be of well-seasoned timber and braced on the under side to prevent possible warping.

The insulated under side of the cover is constructed from heavy-gauge galvanised iron folded to form a tray 2in. deep with the top edges of three sides turned outward to the dimensions of the wood top and fastened with wood screws. The fold at the hopper end is not turned outward, but extends upward ⅞in. beyond the depth of the tray, to be fastened later to the edge of the wood top with screws after being packed with insulation from this end.

The tray is constructed to give a right-angle fold at the hopper end to fit flush against the hopper baffle. The sides of the tray are folded to give a ¼in. bevel inward to prevent jamming in the top of the tank, and the front edge is bevelled inward 1½in. to allow the cover to be lifted from this end without fouling the tank top.

The ⅜in. wire-mesh screen (L in the diagram) to which the heating cable is attached is fastened to the under side of the tray with nine 3/16in. x ¾in. bolts and nuts and is held ⅜in. away from the tray by spacers.

The edges of the tray are drilled for fixing to the top with wood screws.



Layout of cable on wire screen fitted to inside of lid.

Fixings should be marked on the wood top at these points and countersunk to allow the metal to be punched in and the screwheads to be seated flush with the surface.

The tray is packed with glass wool for insulation from the hopper end of the cover after the other three sides have been secured to the top. This end is bent out sufficiently to allow the wool to be packed in, but afterward is folded back and screwed firmly to the edge of the wood top, the corner joints being soldered finally.

The completed cover must be a perfect fit at all surfaces on the tank top to prevent loss of heat.

Heating Cable

The sealed end of the cable is taken through the wire screen and through a hole drilled in the tray and wood top to plug connections (K) housed on the top of the cover at the hopper end. The thermostat should be fitted in line below so that only a short lead is required for plugging in.

The twin cable (M) is fastened on the under side of the wire mesh, being taken round from the outside and worked in to the centre. Keeping each cable ⅜in. apart will take up the full 50ft. of double cable.

The cable must not be kinked, as this is liable to crack the interior insulation. The corners should be brought round on a 1in. diameter turn. The cable can be fastened to the mesh with frame wire. Connecting up must be done by an electrician.

Though other types of heating elements may be suitable for this melter. the specially insulated, 800-watt cable has proved efficient and has the advantage that the heat is evenly distributed over the whole surface of the cover. The makers say that a slight scaling of the outer copper sheathing of the cable will occur at temperatures above 450 degrees F. As the temperature in the melter is regulated to 160 degrees F., there appears to be a very reasonable safety margin.

The cost of a melter made to the specifications described will vary, but many beekeepers are quite able to build it themselves. One very capable beekeeper in northern Hawke's Bay built his melter for less than £15.

Operating the Melter

When the melter is being started, enough honey is poured into the tank to cover the opening at the bottom of the baffle round the honey outlet. The honey and cappings are allowed to rise in the tank to the correct operating level, which is just below the wax outlet. This level must be maintained and is regulated by the movable elbow on the honey outlet. Once this has been set there is little need to alter it.

Cappings in the hopper should be maintained at cover level or just above. Under working conditions the slum has a tendency to move toward the honey-outlet end of the melter, with the melted wax keeping more to the centre. With white combs it is necessary only to remove the slum at the end of the day.

The melter does not have to be emptied if extracting is to be continued within a day or two; it is necessary only to cover the hopper. Power can be switched on and steam applied to the warming tank an hour before extracting starts to prevent sluggishness at first.

Committee on Agricultural Education

THE committee set up by the Government on agricultural education invites submissions in writing from individuals and organisations, which should reach the secretary, Mr. H. Moseley, c/o the Department of Education, Wellington, by 31 March 1957. It would assist the work of the committee if an indication could be given before that date of intention to make submissions. The committee's terms of reference are to consider the opportunities open to young people to enter agricultural pursuits of all types and to progress in them, to report on the adequacy of the educational facilities offered for such occupations, and to make recommendations.

Livestock Farming Problems

Some of the current problems in livestock farming and the progress which research workers are making toward solving them are discussed in the "Proceedings of the Ruakura Farmers' Conference 1956", which has just been published by the Department of Agriculture. The conference volume is being published for the eighth year.

Many farmers may not be able to attend the annual Farmers' Week, but they can get all the information given out, together with subsequent answers to questions, from the "Proceedings". Copies may be obtained from Ruakura or from the Department of Agriculture, Box 2298, Wellington, at 10s. each.

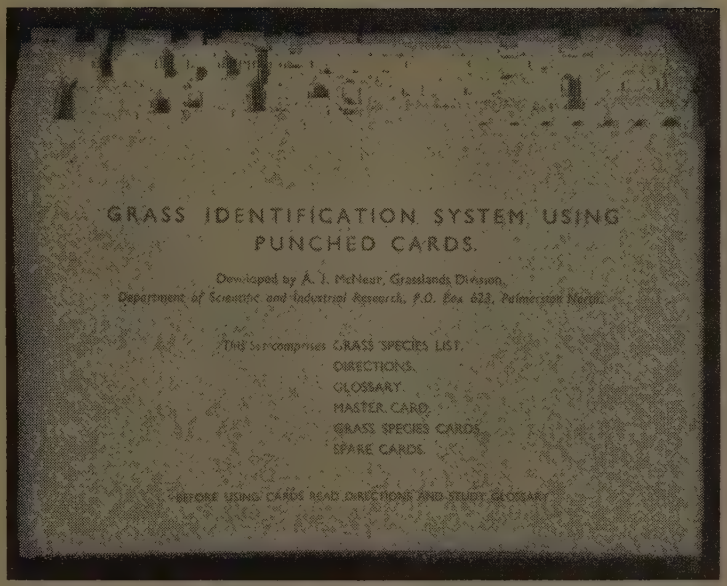
New System for

Identification of Grasses

By A. J. McNEUR,

Ecologist, Grasslands Division, Department of Scientific and Industrial Research, Palmerston North

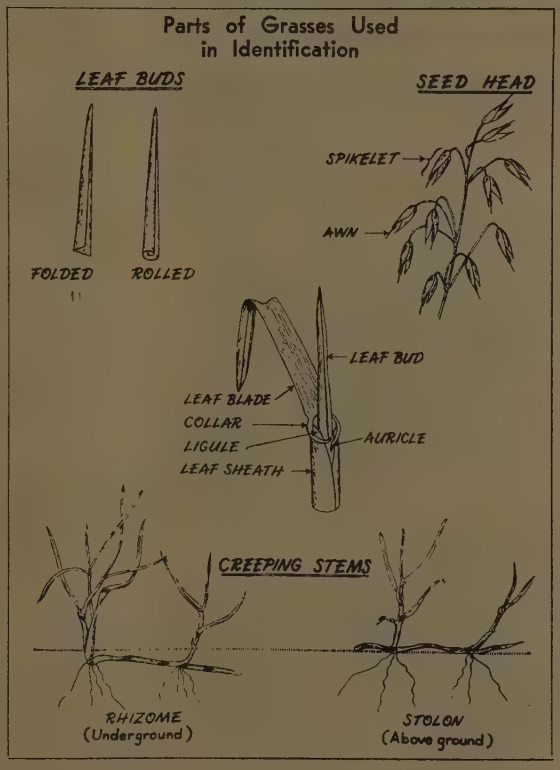
THE usual method of identifying a grass is to refer to a "key" in one of the books on grasses and to go through the characters listed, deciding for each into which of two categories the particular specimen falls. The main disadvantage of this method is that a definite decision has to be made for each character in turn, and this is often difficult. To overcome some disadvantages of this key method the author developed a system using edge-punched cards. In this system only the characters for which a definite decision can be made are used for identification. This system is not of course foolproof, but it does offer a fairly easy means of sorting and naming the more common grass species.



The set of cards used in the system of identification described in this article.

THE botanical identification of grasses is based largely on details of their flower heads, but the procedure requires specialised knowledge and is not recommended for use by the layman. Perhaps a more important limitation is that flower heads of most grasses are present for only a limited period each year and it is desirable to have a method of identification based on characters other than the flower head.

Anyone starting a grass identification must appreciate that the general appearance, colour, growth habit, and size of plants depend very much on the conditions under which the plants are growing. For example, most species when on dry hill country look very different from the same species on wet, fertile flats. However, there



are a number of features of each species that are remarkably constant regardless of growing conditions, and it is largely by these that identification is carried out. These features are described below and are illustrated in the diagrams on this page.

1. Leaf bud: This is the name commonly given to the youngest leaf emerging from the top of a group of leaves. In cross-section this young leaf may be either folded or rolled. In examining leaf buds it is important to make sure they do not belong to a part of the plant that is developing a flower head, because on such parts they sometimes differ from their usual form.

2. Leaf blade: The grass leaf is in two parts. The upper, spreading green part, usually thought of as the leaf, is called the leaf blade. Leaf blades show much variation in detail from one species to another, and characters such as hairiness, roughness, colour, and shape can all be used as distinguishing features. Care must be taken, however, in using some of these characters, because growing conditions can influence them to some degree.

3. Sheath: The portion of the leaf below the blade is cylindrical and is

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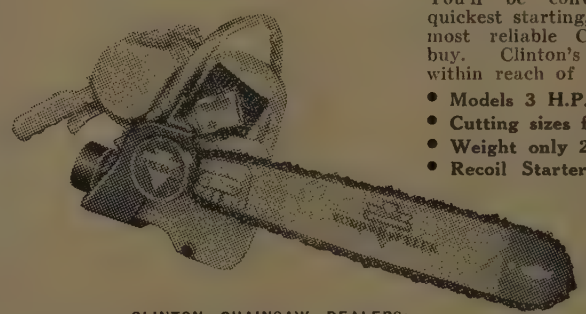

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known as the leaf sheath. In most grasses the side of the sheath opposite the blade is open from top to bottom, often with the edges overlapping. Such a sheath is described as "open" or "split". A "closed" sheath is one in which the edges are jointed for most of the way up from the bottom.

4. Collar: Where the leaf blade and sheath join there is a band of thickened tissue usually different in colour from the leaf blade. This band is

Marked holes being cut out. ➔

called the collar and it is from this region that the ligule and auricles may arise. As these features are particularly constant in any species, their presence and form are of special importance.

5. Ligule: This is a structure that projects upward from the inner side of the base of the leaf blade. It is usually membranous, but may be only a rim of hairs or may even be absent.

6. Auricles: These are usually claw-like projections from the open ends of the collar. They are absent from most grasses, so when present are particularly valuable in identification.

7. Stolons: Most grasses are of compact, tufted growth, but a few spread outward by different means. Stolons are stems that creep over the surface of the ground and often bear leaves and roots at their nodes or joints.

A typical card. ➔

8. Rhizomes: These are similar to stolons except that they grow under the ground and send up leaves at nodes along their length. The twitches that are often so difficult to eradicate from cultivated land are common examples of plants with rhizomes.

9. Spikelet: Sometimes it is necessary to supplement the vegetative details by using the flower head to distinguish between similar species. The spikelet, which is the basic unit of the flower head, is a cluster of flowers or seeds with their surrounding covers. It may contain either one seed or a number of seeds. The arrangement of the spikelets on the flower head is used in grass identification.

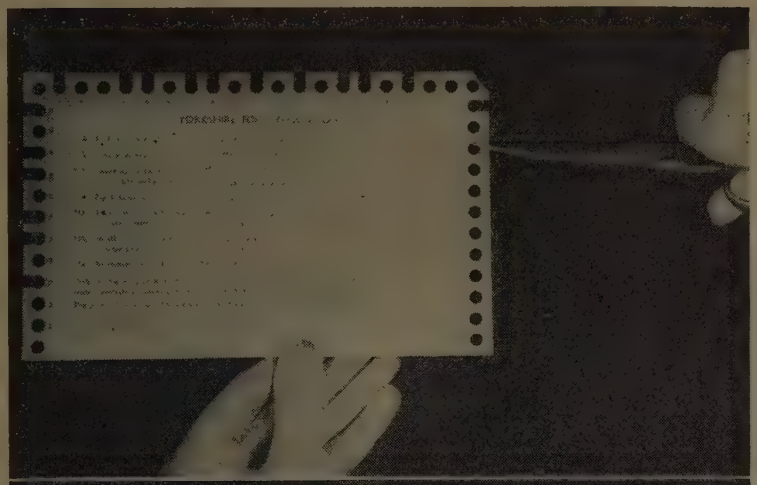
10. Awn: A few grasses have seeds with awns. These are bristle-like

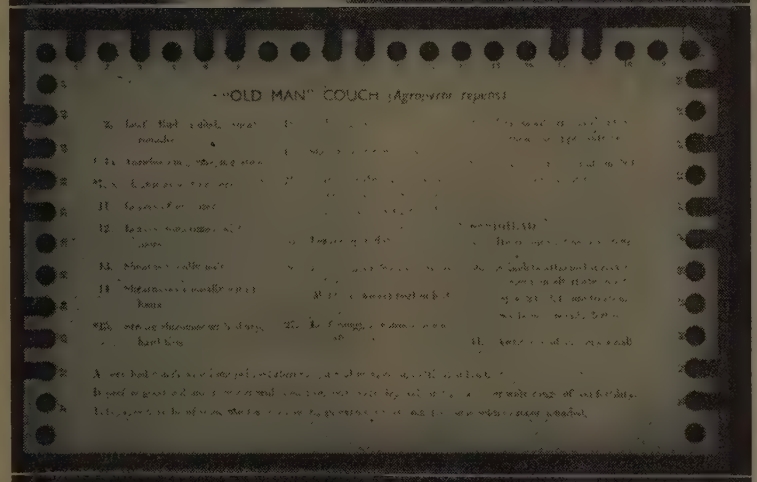
Card sorting in progress. ➔

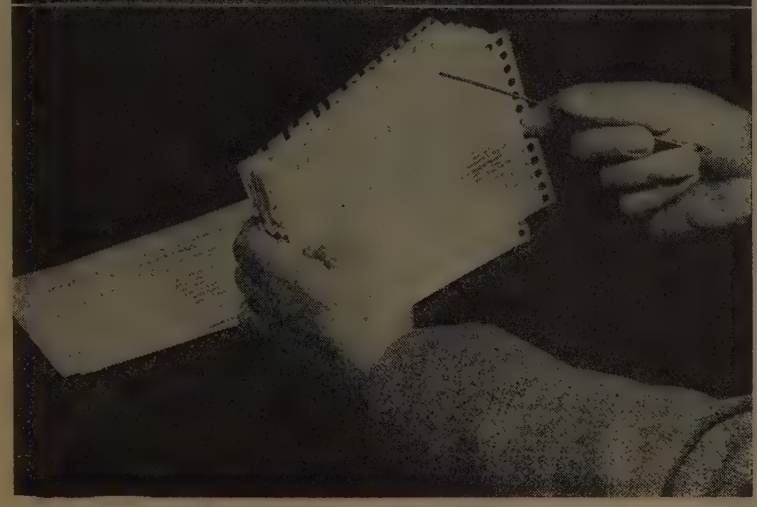
projections which usually arise from the tip or back of the seed or seed covering. Awns may be straight, twisted, or curved. In strength they vary from the fine, delicate type found in Italian ryegrass to the coarse and stiff ones in barley grass.

Identification by Punched Cards

For the punched-card method of identification a set of cards is used in







which each card has the description of one grass species printed on it and has holes punched round the edges. To prepare the set for use it is necessary to clip out the edges of certain holes marked on each card.

An example of how the cards are used follows: The punched cards are stacked with the master card in front and a plant specimen alongside. With the master card as a guide the various features of the specimen are used in turn. Thus a sorting needle pushed in the hole (No. 2) for "leaf bud rolled" and then lifted will lift with it the cards for grasses that have this feature. When these selected cards are used and the needle is placed in the hole (No. 4) for "auricles present", the cards lifted now will be for species that have both rolled leaf buds and auricles. Selection continued in this manner, using "ligule absent", "leaves with hairs", "rhizomes present", and so on will usually eliminate all but the master card and one other, this being the card for the specimen being examined.

In practice this perfect solution is not always found, and two or more cards may remain after sorting. This may be due to the fact that several grasses have almost identical characteristics, or because the operator was not sure which of two alternatives to choose and omitted certain features. Under these circumstances an examination of the details on the remaining cards will usually lead to the identification of the specimen.

Identification by Seed Head

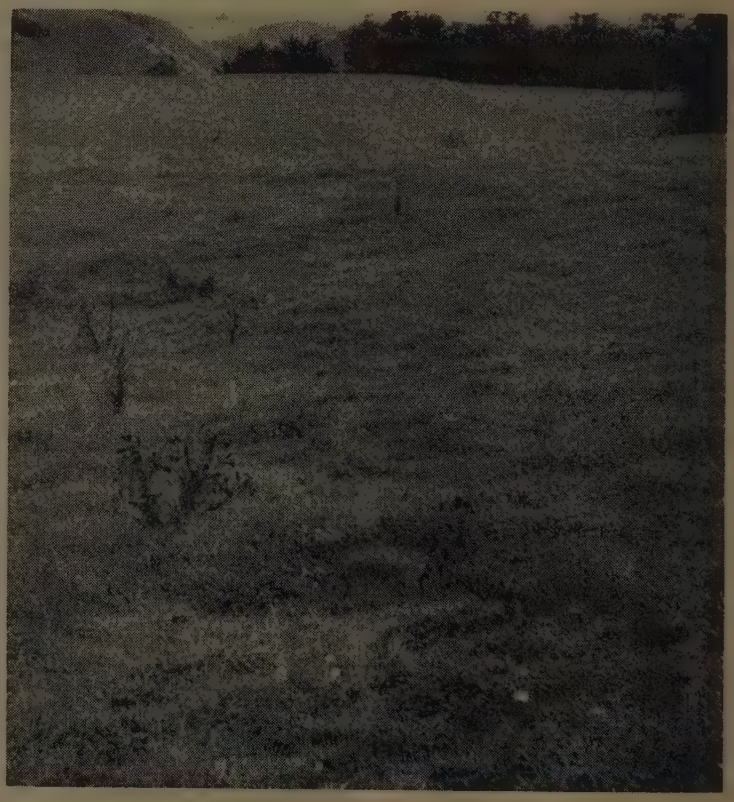
A few grasses may be difficult to identify without a check on the seed head, and for this purpose a few seed head characters have been included on the cards. If no head is present at the time of examination, a specimen can usually be replanted and kept until the heads have formed.

One useful feature of this system of grass identification is that when the sorting needle is lifted in a selected hole the cards on the needle are for grasses that all have the chosen character. These selected cards can then be examined for a study of the grasses with this particular character. Then, too, cards for any unlisted grasses can be prepared and added to the system at any time. These features make this punched card system adaptable and especially suited to students and others interested in studying grasses.

Sets of punched cards, entitled "Grass Identification System Using Punched Cards" and giving details of 48 grass species, are available from the Publications Section, Information Bureau, Department of Scientific and Industrial Research, P.O. Box 8018, Government Buildings, Wellington. The price is 8s. per set.

Prevention of Pasture Damage by Grass-grub

IN most regions in New Zealand damage of pasture land from plague-like infestations by grass-grub (*Costelytra zealandica*) can be expected. On newly developed land, especially on the light pumice soils of the central North Island, disastrous and spectacular outbreaks occur. Established grassland which has been ploughed and resown is also very susceptible to attack, but generally the grass-grub has settled down to a steady, unspectacular, and often unsuspected nibbling beneath the soil surface.



THE strip of paddock with the better growth in the right half of the photograph was broadcast with 2lb. of 100 per cent. para para isomer DDT per acre at the time the paddock was sown in April 1952. Grass-grubs did not attack the pasture until autumn 1956. The photograph was taken on 24 April 1956, over 4 years after the DDT was applied. Fifteen grubs per square foot of soil were found on the untreated portion of the paddock, while the treated portion was free. On this silt loam soil in a medium-rainfall area DDT is thus shown to be fully effective after 4 years.

Only a few extra pounds of butterfat per acre are required during the whole period of effective treatment to repay the cost of applying the requisite dressing of 2lb. per acre of the para para isomer of DDT or the gamma isomer of lindane. Since newly sown pastures are most often invaded, it is recommended that in areas where grass-grubs attack, all new sowings of pasture be proofed against attack with DDT. The insecticide may be applied most safely at the time of sowing, when there is no risk either of contaminated pasture being fed to stock or of poisoning bees and other pollinating insects.

—*B. A. GUNNING,*
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Matamata

THE first growth responses to sulphur on pastures and lucerne were recorded in 1928 in Central Otago and at Richmond near Nelson. Investigations into sulphur deficiency were, however, not proceeded with, mainly because superphosphate was the most commonly used fertiliser and was thought to contain enough sulphur to supply the needs of pastures and lucerne at commonly used rates of application. Experiments with sulphur, however, were resumed in 1952, when it seemed that the world supply of elemental sulphur would soon be exhausted.

SOUTH ISLAND EXPERIMENTS

IN the South Island there are 200 trials with sulphur comparisons; usually either flowers of sulphur or gypsum are used as experimental materials. The number of trials is increasing. A brief summary of results on a district basis is given here: In Central Otago pasture or lucerne responses occur on nearly all soils, under irrigation and on dry land. In some cases growth increases due to gypsum or flowers of sulphur alone are as good as those obtained from superphosphate. In North Otago very good responses to sulphur-containing fertilisers were obtained on nearly every occasion and on a wide variety of soil types. In coastal Southland sulphur does not seem important; further inland, however, a very few experiments indicate that sulphur may be important as a fertiliser material. There are very few experiments with sulphur in coastal Otago, but there are a very large number in Canterbury and Marlborough. Sulphur does not seem to play an important role in the coastal districts with moderate to high rainfall, namely, Banks Peninsula and the Sounds district. In other districts moderate to good responses to sulphur have been obtained on stony, well-drained soils, on the coastal and inland downs of South Canterbury and Marlborough, on some of the more fertile alluvial flats, and above all in the foothill country at elevations of 1000ft. and over. In Nelson and Westland there is no evidence from recent trials that sulphur is of any importance.

FACTORS AFFECTING RESPONSE

It is possible that sulphur responses are affected by the factors given here:—

1. High altitude, that is, cold winters.

2. Low rainfall or droughty soils. There is, however, no evidence yet that irrigation, at least in the short run, alleviates sulphur deficiency.

3. Though a considerable amount of sulphur may be received as salt spray near the coast, in North Otago and also in North Canterbury sulphur responses have been observed very close to the sea. It may be, therefore, that in very low-rainfall areas relative closeness to the sea is not necessarily associated with the absence of sulphur deficiency.

4. There is no clear connection between the pH (or soil reaction) and sulphur deficiency. Good growth responses to sulphur have been obtained on very acid and near alkaline soils.

5. W. R. Lobb first observed that after cultivation sulphur deficiency is much reduced or absent.

APPLICATION

Of the two types of sulphur, elemental sulphur and gypsum, the latter is usually preferred on acid soils. Gypsum also usually seems quicker acting than even finely ground sulphur. Coarsely ground sulphur is not satisfactory. The optimum rate of application may vary considerably with soil type. Much more work needs to be done before clear-cut recommendations can be given. From present experimental results the rate appears to be about 20lb. of sulphur per acre per annum. This would correspond to about 1cwt. of gypsum or 2cwt. of superphosphate. Slight growth responses to sulphur, however, have been obtained to as little as 5lb. per acre. Growth responses to inorganic sulphur compounds (superphosphate, gypsum, elemental sulphur) applied at 20lb. per acre of sulphur equivalent or at lower rates last 1 to 2 years, but decline markedly after the first year.

NORTH ISLAND EXPERIMENTS

The North Island has nearly 150 observational trials and 4 mowing trials on pastures; most of these, however, were begun only quite recently. Stimulation of pasture growth by the application of gypsum or sulphur has been obtained in isolated trials. Quite a good response was obtained at Marton in a mowing trial. A response to gypsum was also obtained on a steep hillside derived from sandstone near Rangiwahia. In all cases phosphorus was also needed for good pasture growth. Marked sulphur deficiency, however, up to the present has been demonstrated only on more recent ash showers, that is, soils derived from Tarawera ash and Ngauruhoe ash.

SUMMARY

1. The discovery that sulphur needs to be applied to many millions of acres to obtain good pasture growth has several consequences of practical value to farmers and manufacturers of fertilisers. On soils on which pastures and crops respond to phosphorus as well as to sulphur it is obvious that a sulphur-containing fertiliser should be used fairly regularly. Present evidence further indicates that sulphur requirements for vigorous pasture may demand annual applications of sulphur at a rate given by 2cwt. of superphosphate or 1cwt. of gypsum, at least under some conditions.

2. Because nearly all experiments with phosphate have used superphosphate as the measuring stick for estimating phosphorus requirements, and because superphosphate contains more sulphur than phosphorus, there is a very large gap in the knowledge of phosphorus requirements on sulphur-deficient soils. Therefore the possibility cannot be ruled out that on some of the dry-land soils of the South Island a fertiliser mixture containing proportionally more sulphur than there is in superphosphate may be more economical. This may apply particularly to fields which have received fairly regular topdressing with superphosphate, as it is known that phosphorus moves very slowly from the topsoil, whereas it is thought that sulphates are leached out relatively rapidly.

3. Several soils are known on which phosphorus did not appear to be of great value to pasture or lucerne growth over 2 to 3 years.

—C. DURING

The Use of Copper on Rukuhia Peat

By I. L. ELLIOTT, Assistant Superintendent, and F. C. C. HUPKENS VAN DER ELST, Research Officer, Rukuhia Soil Research Station, Department of Agriculture, Hamilton

The plots in the background, between the two rows of white pegs, received copper, except the one in the centre. The foreground shows how the copper was carried over plot boundaries by discing after copper had been applied but before seed was sown.

THOUGH much work has already been done in New Zealand on the part played by copper in animal nutrition and its relationship with molybdenum, relatively little work has been done on the use of copper for plant nutrition. A. F. R. Adams has described some excellent results from the use of copper on onions in the Marshland district (1) and I. J. Cunningham has made passing reference to the effect of copper on pasture (2). In the area immediately surrounding Hamilton are large tracts of undeveloped or partly developed peat swamp-lands. These areas have always offered a challenge to those interested in land development whether they be farmers or research workers. Many of the problems of developing this land have already been described in previous articles in the "Journal", and this article deals with the specific place of copper in the nutrition of both crops and pasture plants grown on Rukuhia peat.

GOOD progress was made in the investigations into the establishment of pastures on peat and at various times trace element trials were initiated to see whether trace elements might have some effect on pasture production. These early trials failed to yield worthwhile results until an area was established for growing horticultural crops, when it was postulated that certain symptoms occurring in the plants which were grown there could be explained only on the basis of some minor element being involved.

In the meantime one of the authors had had the benefit of visiting the U.S.A., where he was able to observe many outstanding responses in plants from the application of copper, and as overseas literature on peat soils was rich in references to the benefits to be derived from using copper on this class of soil, detailed trials were established at Rukuhia to see whether such results could be duplicated in this country and whether the symptoms already noted in horticultural crops could be cured by these applications.

Copper Sulphate and Crop Production

The first trial was established in 1953 and consisted of the application of a number of trace elements at right angles to a number of rows of different vegetable crops grown on an area 1 chain wide by 3 chains long. The effects of the application of copper, which was the only trace element to give results, are clearly shown on page 551.

As a result of trying out a large number of different crops, it was possible to define the symptoms of copper deficiency in each crop. These symptoms are set out below:—

Maize: The copper-deficient plants grew only 3ft. to 4ft. high and their leaves showed a marked yellow striping. The bottom leaves turned completely yellowish white and shrivelled up. Cob development was strongly depressed, some cobs failing to produce any seed at all, and others were only partly filled.

Carrots are a very sensitive crop. The plants on the no-copper plots made normal growth during the first 4 weeks, after which no further growth took place. The outside leaves dropped off and a few new leaves were formed. The plants never grew any bigger than normal seedlings.

Spinach is an excellent indicator of copper deficiency. This crop also made normal growth for 4 weeks, after which deficiency symptoms started to show up. The older leaves developed yellowish-white patches at the outsides, which shrivelled up; this was followed eventually by the death of the whole leaf. The plants in this stage are very sensitive to frost. It was noticed that all plants on the untreated plots died off after a few frosty nights and the plants on the copper-treated plots showed no bad effect from the frost.

Broad beans: Most spectacular responses were obtained with this crop. There was an excellent growth for 4 months on all the plots. By this time the plants showed the first flowers and were about 2ft. high. Several light frosts apparently had no effect. A few heavier frosts, however, occurred early in August and affected the broad beans very badly on the no-copper plots, causing them to collapse and die off completely. On copper-treated plots the beans continued to make normal, healthy growth.

Oats are another excellent indication of copper deficiency. The oats grew normally for several weeks, after which they are usually 4in. or 5in. high. Copper deficiency manifested itself by the formation of yellowish-white, withered tips on the leaves.

Copper Trials on Peat

On the Rukuhia Soil Research Station's vegetable area in the Rukuhia peat swamp copper sulphate was worked in at 50lb. per acre at right angles to the vegetable rows. The alternate vigour and lack of vigour of growth indicate the topdressed and untopdressed strips respectively.

The clovery patch of pasture in the foreground is on a strip that had 50lb. per acre of copper sulphate worked into the soil before previous vegetable crops were planted. Pasture in the background had the same fertiliser treatment but no copper sulphate dressing.

▲ Spinach plants grown in boxes. The big, well-developed plant was grown in soil with copper sulphate worked in at 50lb. per acre and the small plant, showing deficiency symptoms on the older leaves, in soil receiving no copper sulphate.

← The well-filled maize cobs are from plants grown in soil receiving a dressing of copper sulphate at 50lb. per acre and the cobs with poor grain formation are from plants grown on untreated soil.

Carrots of the same age. The two well-developed roots grew in soil with copper sulphate worked in; the small carrot grew in soil without copper worked in and grew no bigger than a seedling.

The yellowish maize plants in the centre and the tall, dark green plants at the back are on strips that received no copper and 50lb. per acre respectively.

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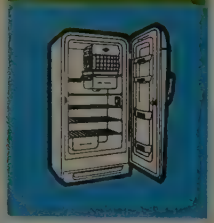

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Plants so weakened were very susceptible to frost and died off completely during frosty periods in winter. In summer they continued to form new leaves in the centre while the outside leaves withered and dropped. In less severe cases of copper deficiency these symptoms were not so pronounced, but seed development was reduced.

Turnips: Copper deficiency symptoms were very similar to those in other crops. Whitish patches formed on the outside of the older leaves. These patches withered and shrivelled up, and in severe cases the plants died off completely, particularly during dry periods in summer or frosty periods in winter. In less severe cases these symptoms were not so pronounced, but root development was retarded.

Lucerne: There were no visible symptoms of deficiency during the first winter after establishment, but a complete change took place in early spring. The copper-treated plots grew vigorously, but the deficient plants made no growth and died off eventually. Foliage on deficient plots was yellowish, in marked contrast to the deep green of copper plots.

The following year the area was again worked up and a further series of crops grown. With no further applications of copper the areas which had previously been treated again showed up to great advantage when compared with those which remained untreated. Typical symptoms of copper deficiency occurred in all places where copper had been omitted.

The results of this work were by this time so outstanding that it was decided to pursue the investigation of copper deficiency as intensively as facilities permitted with the idea of getting comparative yields from treated and untreated areas and also to see whether other minor elements were important in the reclamation of this type of soil. The area used for the initial trials was therefore sown down into pasture. A mixture containing perennial ryegrass, short-rotation ryegrass, and red and white clovers was used. The subsequent history of these pasture areas will be dealt with later in the article.

Several outstanding questions had arisen in the course of the work which required further intensive study. Chief among these was what method of application of copper sulphate would be the best. Accordingly a new area was prepared. Lime at 4 tons per acre was incorporated into the soil, and superphosphate at 3cwt. per acre and muriate of potash at 1cwt. per acre were applied to the area. Oats were then sown and treatments were applied as follows:—

1. Copper was worked into the soil.
2. Copper was topdressed on to the surface of the ground before the seed was sown.
3. Plants were sprayed with a solution of copper sulphate.

In trial 3 a bordeaux spray was used because of the damaging effect of a pure solution of copper sulphate. This trial showed conclusively that quickest and best results were obtained by incorporating the copper in the soil before the crop was sown.

None of the work so far had been really critical in regard to the most appropriate rate of copper to apply, and it is probable that a precise answer to this question under all circumstances will never be found. Results of all observational work up to the present indicate that 5lb. of copper sulphate per acre, though having an effect on plant growth, is not sufficient to produce the optimum effect. On the other hand there appears at this stage to be no definite benefit from applying heavy dressings of, say, 100lb. or 200lb. per acre, and it would seem that best results are likely to be achieved through the use of between 10lb. and 30lb. of copper sulphate per acre.

Copper Sulphate and Pasture Production

Specific recommendation for the use of copper sulphate on pastures has been limited to advice on controlling abnormal conditions in the animal and recommendations have been made by Dr. Cunningham that 5lb. of copper sulphate per acre per annum should be applied to pastures to control these troubles. Nothing in this article is intended in any way to contradict Dr. Cunningham's findings. The information given here should be considered supplementary to Dr. Cunningham's findings.

The difference between plots treated with copper sulphate and those untreated. On the left, where no copper was applied, Yorkshire fog has become dominant. On the right clover has responded vigorously to ample copper.

When the first area on which the outstanding copper responses described was sown down into pasture no more copper was applied, but in the succeeding year extraordinary differences began to appear. These differences are illustrated on page 551.

Most farmers are familiar with the sort of response obtained when nitrogenous fertiliser is applied at the right time and gives good results. The response obtained from copper was almost identical in appearance; treated areas were dark green, vigorously growing, and more healthy. Plants on treated areas were much taller than those on the untreated controls. Control areas remained yellow and unthrifty in appearance. Clovers were affected before grasses, though the effect on grasses was also plain. Under the conditions of the trial red clover was stimulated at an earlier stage than white clover, but all forms of clover were beneficially affected by the copper application.

Because this area had been specially treated for the production of vegetables and large quantities of lime (10 tons per acre) had been used, it was felt that these conditions were so far removed from those in normal pasture establishment that new trials were required. Accordingly an area was cut off from a pasture sown down

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in 1954. Alternate strips of this area were treated with rates of copper sulphate varying from 10lb. to 60lb. per acre. After about 6 months outstanding results again began to appear. Though this was not a properly replicated trial, there were 6 copper treatments and 5 untreated plots between these treatments, and cuts have been made on several occasions, with the results shown in Table 1.

TABLE 1—PERCENTAGE INCREASE OF COPPER-TREATED PLOTS

First cut, 27/11/54	63
Second cut, 27/9/55	71
Third cut, 21/10/55	24
Fourth cut, 22/11/55	30
Fifth cut, 19/12/55	25
Sixth cut, 16/1/56	17
Seventh cut, 20/2/56	6

Some very interesting points emerged from these trials:—

1. The first plots to show a response were those on which the lightest rates (10lb. and 20lb. per acre) of copper sulphate had been applied. The heavier applications (40lb. to 60lb. per acre) appeared to give a slight, temporary depressing effect.

2. The first plants to respond were the clovers, and once again the effect of the treatment appeared very similar to that obtained from a nitrogen application. Where no copper sulphate was applied deficiency symptoms on the clover leaves were clearly observable.

3. The heavier treatments have gradually become better and the slight depression quickly gave way to a very clear and strong response.

4. These responses are often a long time in showing up and 3 to 6 months often elapse before the full benefit of the treatment is obtained.

5. The greatest response occurred in late winter and spring, and the response fell off to almost nothing in summer.

Results at Moanatuatua

About the time the last trial described was being proceeded with some 50 acres were sown down at Moanatuatua on an area on the fringe of the Moanatuatua swamp, situated in the triangle between Cambridge, Te Awamutu, and Hamilton, which was bought for experimental work by the Soil Conservation and Rivers Control Council. The area is exceedingly raw Rukuhia peat, and in the trial area the peat is over 30ft. deep.

The area used came straight from stunted manuka and wiwi rush. After discing and firing to dispose of the rubbish on the surface further discing was carried out to prepare a seed-bed. Two tons of lime per acre were applied and 3cwt. of superphosphate and 1cwt. of potash were used at the time of sowing. Some of the areas were sown down without copper sulphate, and other areas received 16lb. of copper sulphate per acre. The early results obtained, particularly when

A carry-over effect from a previous dressing. On the left, where no copper has been applied, little clover growth is evident compared with the area on the right, where copper was applied. Though both red clover and white clover have been stimulated, red clover is dominant.

the extraordinary circumstances under which the pasture was initially established are considered, were an outstanding justification for the methods advocated by Rukuhia Soil Research Station in pasture establishment.

However, though this was so, shortly after sowing in autumn the hard winter conditions soon began to make obvious the differences between those areas which were treated and those which were not treated with copper. A casual glance at the copper-treated area would have led to the belief that a depression from the use of copper sulphate had been obtained, and such indeed was the opinion of many observers who saw the area at that stage. Close inspection, however, revealed the following facts:—

1. On those areas topdressed with copper, ryegrass, though appearing unhealthy at this stage, was persisting. On untreated areas ryegrass had almost completely disappeared.

2. On no-copper areas Yorkshire fog rapidly became dominant. This grass appeared healthy, and therefore the non-treated areas compared favourably with their copper-treated counterparts, and this was probably basically responsible for the suggestion that a copper depression was being obtained.

3. The small white clover plants on the untreated areas were unhealthy and appeared to be dying, whereas on the copper-treated areas the clover, though not strong, appeared to be healthy and was surviving.

This was the state of affairs during winter, but with the return of the warmer conditions of spring and summer the responses have been most marked. Some of these responses are illustrated.

The observations which have just been made would be more appropriately described as a demonstration rather than an experiment, but at the same time a new experiment was established on one of the areas at Moanatuatua cut out from the original pastures and on an area not treated with copper sulphate. This trial was laid down to obtain further information on the most appropriate rates of copper sulphate to be applied, but has not been established long enough for any final deductions to be made. Results to date, which are set out in Table 2, fail to show any advantage from applying higher rates than 5lb. per acre of copper sulphate.

TABLE 2—PERCENTAGE INCREASE OF COPPER-TREATED PLOTS

Rate of copper sulphate (lb.)	5	10	20	40	80
First cut, 25/11/55	78	50	36	36	54
Second cut, 20/12/55	98	140	128	121	158
Third cut, 3/2/56	86	71	60	68	71

In the establishment of this trial buffer strips 60ft. long were left between the rows of treated plots, because previous experience had indicated how easy it is for the effects of these treatments to be carried by cultivation implements over the boundaries of the plots, especially as the copper was applied to the surface and worked into the ground. Ten months after sowing it was most interesting to observe that the discs had contaminated an area outside the plots almost as long as the plots themselves, and that the extent of the exterior contamination depended

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on the rate of copper applied to the plots; that is, where the heavier rates of copper were applied a bigger area outside the plot was affected than where lower rates had been applied. This is illustrated on pages 553 and 555.

Summary and Conclusions

This article has described the results of some 6 years of experimental field work on the use of copper sulphate on plants grown on Rukuhia peat. It has been clearly demonstrated that however important the role of copper in animal health may be, it has at least as important a part to play in plants, and that it is no longer safe to consider its future purely as it affects animals. Symptoms of copper deficiency in a large number of different plants and clovers have been observed, photographed, and described. The precise course of the effects of copper sulphate on the establishment of a young pasture on deep, raw Rukuhia peat has been described and its ultimate effects are being measured.

Arising from this work many points still remain unanswered, and before any definite recommendations are made these points will be discussed briefly:—

1. In his work Dr. Cunningham pointed out that even 20lb. of copper sulphate per acre applied to pasture annually did not induce copper levels in the plant which were toxic to the animal. He found, however, that 5lb. of copper sulphate annually raised pasture copper sufficiently to prevent animal disease and he recommended this quantity as the most economic control measure.

When the pasture topdressed was long there was a considerable increase in apparent copper content because some of the copper sulphate adhered to the leaves. This increase was much greater when an insoluble powdered compound was used. When the topdressed pasture was grazed off, the new growth did not have an abnormally high copper content.

Toxic effects from copper sulphate topdressing were regarded as unlikely, though they may occur when sheep are lightly stocked on pastures that are topdressed in the long stage of growth. Cattle are much less susceptible than sheep to copper poisoning.

In the April 1954 issue of "The Journal", page 373, Dr. Cunningham indicated that for animals four methods of applying copper are satisfactory:—

1. Drenching.
2. Addition to drinking water or spraying on to hay.
3. Licks.
4. Topdressing pastures.

It must be conceded that though the first three of these methods will prevent peat scours in animals, none of these three could be recommended for plants. The only method which will satisfy the needs of both plant and animal at the same time is the incorporation of the copper in the soil by topdressing.

2. Insufficient work has yet been done to determine precisely where copper responses may or may not be obtained. The authors are of the opinion that it is safe to assume that the whole of the undeveloped peat areas of the Waikato and Hauraki Plains will be highly responsive to copper applications provided they have not been subject to flood from lands adequately supplied with copper; but here again some qualifications need to be made.

The responses to copper sulphate which have been obtained have been on areas sown down where adequate provision has been made for the pasture's requirements of lime and major elements in the form of phosphate and potash. Copper applied to pastures sown down on the ash with little phosphate, potash, or lime may fail to give the results indicated from the trials.

A second point is that many farmers have benefited greatly from the results of Dr. Cunningham's work and have made widespread use of copperised superphosphate on their farms. It is quite apparent that copper is strongly fixed in the soil and that the results as reflected in plant growth may be obvious many years after an initial application. Research work has not been going on long enough to set any limit on the time from which it would be reasonable to continue to expect responses from various applications of copper sulphate. However, it can be said that applications of 50lb. per acre are still giving strong responses 3 years after. Completion of present experimental work will be necessary to give the required answer to this particular question.

Some of the other peats and peaty loams in the Waikato and Hauraki Plains district contain relatively large amounts of mineral matter, and accordingly many of these soil types are designated as "peaty loams" or "loamy peats". It is probable, but by no means certain, that where such soil types occur copper responses will not be obtained, but the distribution of copper responses can be adequately plotted only on the completion of the present work of the Extension Division.

Because of the restricted nature of the experimental work so far carried out and the magnitude of the responses obtained, the authors suggest:—

1. For crops: Farmers should not assume that they will automatically get a copper response. A test can be made by treating a crop with copper sulphate at 20lb. to 30lb. per acre. The copper sulphate should be lightly worked into the soil with the fertiliser before seed is sown, as contact by the seed with the copper sulphate will result in severe germination injury. A strip not less than 20ft. wide where no copper is applied should be left through the paddock. When the copper sulphate is being worked into the soil care should be taken to avoid working across this strip. The crop should be supplied with other essential requirements, and an Instructor in Agriculture will advise what these are. The differences between treated and non-treated areas should be observed. If the treatment is considered worth while, it can be incorporated as a regular part of farm practice where the same conditions apply.

2. For newly sown-down pastures the procedures already described in the "Journal" for the establishment of pasture should be followed. If the peat is raw, copper sulphate should be worked into the soil at 5lb. to 10lb. per acre before the seed is sown. An untreated strip should be left across the paddock and the same procedure followed as described for crops.

3. For established pastures: The authors believe that unless pastures have been established with due attention to their need for lime, phosphate, and potash they will be unlikely to respond to surface dressings of copper sulphate. The reason for this is that unless the pasture has been adequately supplied with the major nutrients it is more than likely that one of these rather than copper will limit production.

Another situation in which responses from copper applications may not show up is where pastures have already been topdressed with copperised superphosphate for stock health. In these cases plants will have received enough copper to meet their requirements.

Where copper has been supplied to stock other than by topdressing, and where pastures have been well treated with lime, phosphate, and potash, farmers would be well advised to apply the 5lb. of copper sulphate per acre per annum normally advised as a topdressing.

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1. A. F. R. Adams, "New Zealand Journal of Science and Technology", vol. 30(A), No. 2, page 105, 1948; vol. 31(A), No. 3, page 34, 1949.

2. I. J. Cunningham, "Copper Deficiency in Cattle and Sheep", Department of Agriculture Bulletin No. 238.

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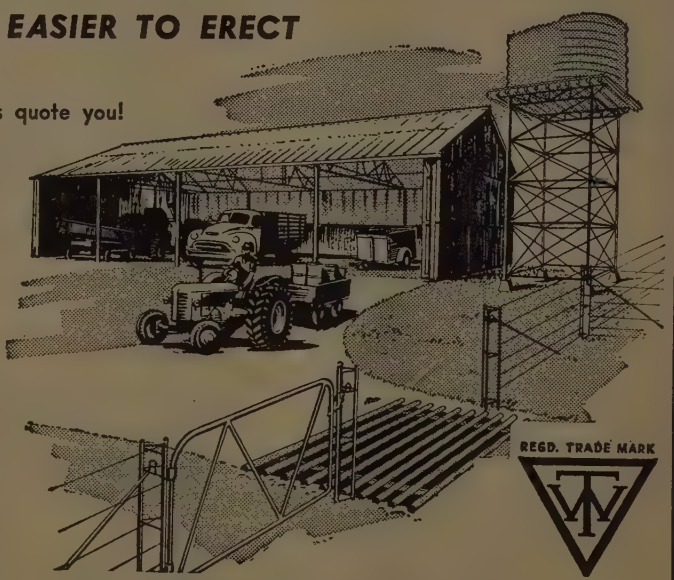

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Extracting Honey in Domestic Apiaries

Seasonal Notes for the Domestic Beekeeper

PROVIDED there are a reasonable number of fine, sunny days during the next 2 months and the bees have been properly cared for, the beekeeper can expect to have quite a little of his spare time taken up in the extracting of his honey crop. Methods for the extraction of this surplus honey are described in this article by A. W. Bennett, Apiary Instructor, Department of Agriculture, Hamilton.

WHERE section honey has been produced the beekeeper requires no extra equipment to harvest this crop. The removal of freshly stored honey from the combs, however, entails quite a considerable amount of work, and some equipment is needed, the minimum requirements being:—

1. Sharp knife with long blade.

2. Tall jug to hold boiling water.

3. Tray to take cappings fitted with a strainer and frame rest.

4. Extractor.

5. A spare tin or two and a fine strainer or straining cloth (cheese cloth).

1. Though an ordinary kitchen knife can be used for uncapping combs, it will be more satisfactory to purchase a knife especially made for the job. These are called uncapping knives, have both edges bevelled and sharp, and can be procured in 8in. or 10in. lengths. The price is about 19s.

2. Some beekeepers find that they can readily uncap a comb with a cold knife, but most prefer to have the knife warm, as it will then go through the capping with very little effort. To warm the knife it is necessary to have a hot water container that will allow the knife to be immersed to its full length. The water has to be changed frequently or kept hot by a small kerosene lamp or electric element.

Beekeepers who have several hives and will be handling several hundred pounds weight of honey should perhaps consider the purchase of what is called a steam-heated uncapping outfit. This comprises an uncapping knife similar to the one just described but which has in addition a copper jacket soldered on to one side. This allows for a continuous passage of steam, which keeps the knife hot while it is being used. A can of about ½-gallon capacity is fitted with an electric element and steam is taken to the knife by a rubber tube. These units can be purchased from dealers in beekeepers' supplies.

3. When the cappings are cut off the comb it is inevitable that a certain amount of honey is removed with the cappings. Some arrangements have therefore to be made to allow this honey to drain from the cappings so that it can then be strained and put in with that just extracted. The uncapping tray is just some container large enough to collect the cappings as they fall from the knife. A 60lb. honey tin opened at either the end or side will do quite well. A piece of cheese cloth is tied loosely over the opening. On top of this rests a strip of wood with a pointed piece of metal fixed in the centre. This acts as a rest for the frame of honey and allows it to be swung round readily so that the other side can be uncapped.

A Cappings placed on clearer board with escape removed. A piece of timber is put across the board just beyond the escape hole to prevent wax particles from falling into the hive.

V An empty super and lid are placed above the clearer board. The bees can then remove any honey and leave the cappings dry and ready for melting into wax cakes.

4. A small extractor usually has two baskets or compartments, in which the combs are held while the honey is being extracted by centrifugal force. Some machines have baskets which are pivoted. This enables the baskets to be swung round when the other sides of the combs are being extracted. In a non-reversing extractor the combs have to be removed and turned round after each side is done.

5. Unless a small tank or cream can is available, several large tins with the tops cut out should be provided to take the honey as it is extracted. Straining should be done while the honey is still warm. A much finer strainer cloth can be used if the honey is warmed to about 100 degrees F. This can be done by placing the tins of honey in hot water. Honey should never be put in the oven or on the range, as it is likely to be burnt unless extreme care is taken to keep the honey moving all the time.

Removing Honey from Hive

Before any extracting can be done the honey must be removed from the hives. The beekeeper should endeavour to take only combs that are completely capped or nearly so. Uncapped combs should be left for the bees to complete the ripening process and can be taken the next time extracting is being done.

The easiest way to take the honey from the hive is to use a clearer board fitted with one or two Porter bee escapes, provided the honey is above a queen excluder. Bees will not use the escapes if there is brood in any of the combs.

The clearer board should be built to the same size as the top of a super (Langstroth size 20in. x 16in.), the beekeeper making use of any pieces of hardboard of that size available. Round the edges on both sides are strips of wood ⅞in. wide and about

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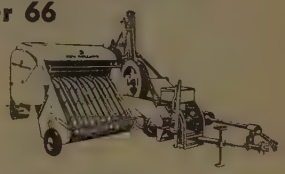

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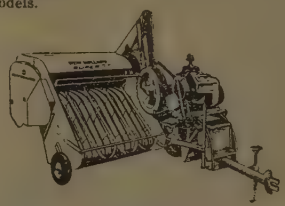

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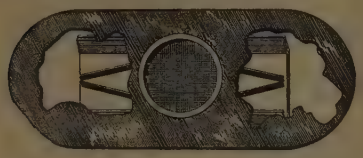
⅜in. thick. The diagram at right shows how these are cut to give maximum strength to the board.

The Porter escape is a metal trap through which the bees can pass one way only. It is perhaps best to fit two of these escapes to each board so that if one gets blocked by a drone bee the super will still be cleared through the other. These escapes can be purchased from appliance dealers. Before the escape is fitted to the board make sure that the sensitive springs are adjusted correctly. The general construction of these escapes is shown in the diagram below.

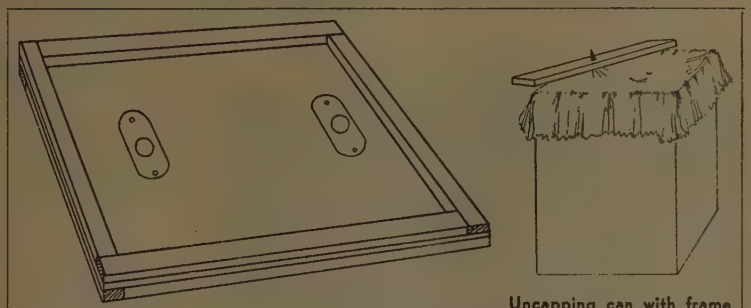


Porter bee escape. Springs at both ends should be about ⅛in. apart.

The clearer board should be placed on the hive under the super of honey to be taken off the day before the extracting is to be done. Make sure the escapes are the right side up and the super fits snugly on the top. These escapes will not work properly if other bees can gain access to the honey under a poorly fitting lid or a badly constructed super.

Shaking or Brushing Method

Another way of removing the full combs of honey is by the shaking or brushing method. After the hive has been given a puff or two of smoke each comb is removed and the bees are shaken in front of the hive; any remaining can be brushed off with a feather, tuft of grass, or soft brush. The combs are placed in an empty super and kept covered.



Clearer or escape board. Note how the strips of wood are placed to give maximum strength.

Uncapping can with frame rest and strainer cloth to hold cappings.

This method is not recommended for the end of the season or during a break in the honey flow, as bees get excited and will quickly start to rob.

Extracting

When the honey has been removed from the hive and all equipment is ready extracting of the honey should be completed at once. To uncap the comb stand the frame upright with the side bar resting on the pin in the wooden rest (see diagram at right above) placed on the uncapping can. Hold the frame with the left hand; then with the hot knife in the right hand begin to cut the capping, starting from the top. A sawing motion with the knife will often make uncapping easier. When one side of the comb has been uncapped swing the frame round on the pin and do the other side.

The combs are now ready to be placed in the extractor. Experience will tell what speed is required to remove all the honey. Do not let the honey in the extractor reach a level about the centre bearing. Carefully strain the honey to remove fine wax particles and then leave the honey for about 2 days before removing any particles that have risen to the surface.

Return the empty combs to the hive. If a honey flow is still on, they will be refilled surprisingly quickly, and another weekend will have to be devoted to extracting.

Cappings

After draining into the uncapping tray has ceased the cappings can be placed over the bees on top of the clearer board (from which the escape should be removed) and an empty super placed round the cappings. The lid is then put on top. This will allow the bees to pass up through the escape hole and take down any honey that is left in the cappings. When these are dry they should be removed and melted into cakes of wax.

Captan Inhibits Fermentation of Wine

CONFIRMATION of French experience that the fungicide captan can inhibit the fermentation of wine has been obtained at the Department of Agriculture's Te Kauwhata Horticultural Research Station. It appears that grapes intended for wine making should not be sprayed with captan during the last month before harvest.

A. Michel and M. Marichal (both of the Wine Research Station of Beaune, Burgundy, France) published their findings about the inhibiting action of captan on the fermenting yeast in the 29 April 1956 issue of "Progres Agricole et Viticole" (Montpellier, France). Peynaud, Lafourcade, and Cordonnier (all of France) reported similar observations in 1954.

In the experiments of Michel and Marichal, Pinot Noir grapes were sprayed with 0.5 per cent. captan solution on 30 August. From 1 September samples of grapes were taken weekly and the juice of grapes was fermented out. Unsprayed grapes were also sampled and their juice was fermented under identical conditions.

It was found that though the juice of the unsprayed grapes fermented normally, the fermentation of juice from grapes sprayed with captan was very sluggish. Growth of parasitic fungi (*Penicillium* and *Coniothyrium*) was found on the surface of the slowly fermenting wine. The inhibiting action persisted for 42 days after the spraying, but it was possible to counteract it by pumping over into another cask and by inoculating with fresh, active yeast.

In heated fermentation, practised in Burgundy for better colour extraction, captan not only inhibited the fermentation of the juice but destroyed its colour.

Similar observations were made by the author in the wine cellars of Te Kauwhata Horticultural Research Station during the 1955 wine making season. The juice of grapes sprayed with 0.5 per cent. captan a fortnight before harvest failed to start normal fermentation and it was necessary to pump the juice into another vat (leaving the sediment behind), to inoculate it with fresh active yeast, and to add 0.1 per cent. dibasic ammonium phosphate as extra yeast food. After this treatment fermentation and the resulting wine were normal.

—*D. S. KASZA,*
Viticulturist, Department of Agriculture Te Kauwhata Horticultural Research Station

Care of Livestock during January

Contributed by the Animal Research Division

SHEEP DIPPING

MODERN dips are so effective that the eradication of lice and ticks should be quite feasible. However, best results will be achieved only if the instructions for mixing and replenishing dips are followed accurately. Carelessness in dipping can cause disastrous losses. If sheep are dipped off shears, the shear cuts are likely to become infected and deaths from blood poisoning may occur. These can be prevented by vaccinating the sheep with blackleg vaccine at least a fortnight before dipping them. The vaccine is available at a reasonable price. Veterinarians or Livestock Instructors should be consulted about its use.

LAMB-FATTENING FODDERS

Rape should not be grazed until the leaves show a purplish tinge. "Unripe" rape does not fatten so quickly and seems to "scald" more readily. Best results are probably obtained by grazing in breaks which last the lambs about a week. Keeping lambs on a break until the last leaf is eaten is false economy; they should be moved on while they are still getting a full feed, and the paddock can be cleaned up with ewes. Run-offs have little to recommend them, and unless they contain good pasture, they will depress the lambs' rate of growth. If hay is fed, it must be of the very best quality.

Thousand-headed kale is splendid lamb-fattening fodder, but because it is relatively unpalatable, it must be managed properly. It must always be fed in small breaks and grazed only lightly before the lambs are moved on to the next break. A run-off should never be used. Treated in this way, kale makes excellent regrowth and can be regrazed several times; if necessary, grazing can be extended into autumn and winter.

EWE CULLING

After lambs have been weaned the ewes should be gone through carefully to select those which require culling. Feet and wool should be examined carefully. Special attention should be paid to udders and teats, and ewes should be culled if they have defective udders or very large or damaged teats, as the lambs of such ewes often die from starvation before they are a week old. Provided ewes are in reasonable condition and have sound udders and good fleeces, they should be retained. Even "gummy" ewes will rear satisfactory lambs on good pasture.

Lambing percentage increases with the age of the sheep, reaching the highest level at 5 to 8 years. Many ewes on fat lamb farms could well be kept for 1 or 2 years longer, but fat ewes which have not reared a lamb should be culled. Ewes should be kept on low rations for 2 months after weaning to prevent their becoming overfat.

FOOT-ROT ERADICATION

Campaigns for foot-rot eradication should be started as soon as the lambs have been weaned. Once foot-rot has been eradicated from a flock it does not recur unless it is reintroduced from outside.

ERGOTISED GRASS MAKES DANGEROUS HAY

Serious lameness can be caused by cattle eating hay heavily infested with ergot. Such hay can be easily recognised by the black ergots which replace the seeds of ryegrass and other grasses. Where ergot is known to occur hay should be made before the grasses have time to seed.

LAMB WEANING

Weaning is an important event in the life of a lamb and special care at this time will be well repaid. Longwool lambs should be shorn and all others crutched. If the weather is wet, lambs should be given a full dose of 20 grammes of phenothiazine at weaning; otherwise drenching may be postponed until rain falls. If fattening crops are not available, lambs should be drafted into "clean" paddocks.

Lambs should never be weaned into paddocks in which ewes and lambs have been grazed during the previous month. Unless very good paddocks of spelled pasture are available, hoggets should be spread thinly over as large an area as possible.

ST. JOHN'S WORT MAKES DIPPING DANGEROUS

Sheep that eat St. John's wort become sensitive to sunlight and develop scabs on the ears, face, and back. If sheep in such conditions are dipped, they take convulsions and may be drowned. If possible, sheep should be grazed on country free from St. John's wort for several weeks before dipping. If this is not possible, they should be dipped only on dull days.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during October and for the 3 months ended 31 October 1956, with comparative figures for the same month and 3 months of 1955, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
October 1956	24,924	404	25,328	—
October 1955	22,180	387	22,567	—
Increase or decrease ..	+2,744	+17	+2,761	+12.235
3 months ended 31/10/56	50,272	763	51,035	—
3 months ended 31/10/55	48,858	789	49,647	—
Increase or decrease ..	+1,414	—26	+1,388	+2.796

Butter in store at 31 October 1956 was 22,700 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
October 1956	10,129	1,682	11,811	—
October 1955	9,669	1,495	11,164	—
Increase or decrease ..	+460	+187	+647	+5.795
3 months ended 31/10/56	17,782	2,098	19,880	—
3 months ended 31/10/55	17,683	2,034	19,717	—
Increase or decrease ..	+99	+64	+163	+0.820

Cheese in store at 31 October 1956 was 16,200 tons

If these figures are converted into butterfat equivalent, there is an increase of 2.496 per cent. in butterfat graded for the 3 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Pasture Establishment and Management

Seasonal Notes by the Extension Division

CULTIVATION for pastures to be sown this autumn should be started early and aimed at conserving moisture, controlling weed growth, and having the seed-bed fine, firm, and friable and ready for sowing as early as rains in late summer and early autumn allow. In many districts summer fallowing is the most certain method of securing a satisfactory strike of grass and clovers, as it brings the land to a high state of fertility and makes it rich in available nitrogen, moist, and firm, all qualities that provide for vigorous initial growth of the young grass. Depending on seasonal effects in various districts, sowing times vary from late December to early March or even later. The essential point is to have the seed-bed prepared in time for sowing according to district practice, remembering that it is futile to sow when the soil is too dry. Soil temperatures are generally high at this time of the year, and pastures sown then should make rapid growth and be ready for the first feeding off in late autumn, before the land becomes wet and stacking difficult.

SEED-BED METHODS used for preparing a good seed-bed vary so much according to soil type, previous crop, and length of time available to get the land ready that it is impossible to lay down anything hard and fast. The biggest variations between these practices occur between areas of wet and dry climates. Where rainfall is low the greater is the need for fallow and correct preparations, especially where pastures are intended to be permanent. The point to remember is that soils settle and firm naturally if given time, and the longer the land is in the course of preparation the more time there is for natural assistance in the process. The roller is an important implement in the firming of the seed-bed and it does more effective work on the furrow than it does later in the cultivation, where harrows can be more frequently used. Late and hurried work in preparing land for grass seed after cereals is seldom satisfactory on light soils and is not good on most soils. The seed-bed should always be firm and the seed sown to a depth where moisture is likely to be retained, subsequent loss of moisture being taken into account. This loss of moisture is a variable factor, depending on the susceptibility of various soils to caking or excessive drying out.

—R. L. BENNETS

* * *

OVERSOWING PASTURES CAREFUL consideration should now be given to procedures to be followed in oversowing inferior pastures with grasses or clovers or with both grasses and clovers. Labour and money are often wasted in this work if conditions are not suitable for the establishment and subsequent vigorous growth of the oversown species. Seed-bed preparation is generally necessary for grasses, though for clovers suitable preparation can often be made by grazing. District practices in oversowing vary greatly and where there is doubt regarding procedure advice should be sought from the local Instructor in Agriculture.

OTAGO PRACTICES Oversowing is generally resorted to in an effort to increase the productivity of pastures from which the better, higher-producing species have apparently disappeared, or where these have been dominated by lower-producing species more suited to lower-fertility levels or poorer management techniques. Very often the correction of mineral deficiencies or other limiting factors will result in improvement of the pasture without resort to surface seeding. Given favourable conditions for growth, it is surprising how the higher-producing species will suppress the poorer grasses and pasture weeds. Should the pasture be beyond redemption by correction of these limiting factors, ploughing and resowing associated with correct fertilising and management are probably the wisest course to follow.

There are, however, certain special circumstances under which surface sowing may be warranted. Provided fertility is high and clover growth good, sowing of grass seed should be beneficial where grasses have been eliminated by grass-grub or porina (*Oxycanus*) attack, or on recently developed areas where pastures have become clover dominant through failure of the better grasses in the early stages when nitrogen was deficient.

Autumn is the best time to surface sow grasses, and seed should be sown on areas which have been hard grazed. Harrowing after sowing will not only improve germination, but will temporarily restrict growth of the established species and reduce competition. Grazing after sowing should be lenient but sufficient to prevent smothering of the seedling grasses. Surface sowing of clovers should be of value where clovers are non-existent or where only low-producing types are present. For success fertiliser must also be applied and where necessary areas should also be limed adequately. On areas where some clovers are already present aerial sowing in winter and early spring has resulted in good clover establishment. Under very low fertility, where clovers are non-existent, best results have been achieved by adequate liming where necessary, followed by mechanical introduction of clover seed and fertiliser by a sod-seeding machine or a grain drill fitted with grassland tips. Areas surface sown with clovers should be lightly grazed to control excessive grass competition in the first year, but should be spelled as early as possible, probably in the second summer, to permit reseeding of the sown species.

—S. M. J. STOCKDILL

* * *

WHITE CLOVER SEED WHITE clover seed areas in Canterbury are normally closed during the last week in October and the first week in November. Hard grazing before closing is recommended. This causes the plants to stool and produce more seed heads and also checks the growth of associated ryegrass. As the plants continue to blossom for some time, ripening is somewhat uneven. The crop should be cut when most of the heads are ripe, that is, when they are dark brown and the seed comes away freely when heads are rubbed in the hand. It is not advisable to wait for all the heads to ripen, as the early ones will fall off before the late ones mature. Furthermore, the early heads usually carry more seed than the late ones. After the crop is cut it should be left for a week or 10 days in the windrow before it is headed. Care should be taken not to head too soon, as clover seed will heat quickly if it is bagged out of condition. Where growth is short and the swath cannot be picked up with the draper head various attachments, including a brush pick-up, are available to fit any standard make of header. A special low-cutting bar for mowers is also procurable.

—R. P. HUNTER-WESTON

Bull-Dog Tight Grip

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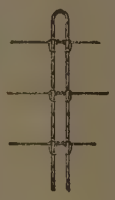

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Annual Loss From Hydatids In Sheep Put At £750,000

AUCKLAND, February 10 (P.A.). —Losses through hydatids in sheep and lambs were probably costing the New Zealand meat industry about £750,000 a year, said the chairman of the Meat Board, Mr. J. D. Ormond, in an address to the annual conference of the New Zealand Veterinary Association at The Chateau today.

. . . how much was *your* loss?

Dogs spread hydatids

Dogs, although not themselves subject to hydatid cysts, can pick up hydatid tapeworms, mainly from eating raw offal. In their droppings, the dogs scatter hydatid eggs which, as dust, are blown on to pasture or adhere to the coats of animals and so reach human hands.

Simple precautions

1. Always boil raw liver, lungs, etc., before feeding to dogs. Otherwise bury or burn all offal.

2. Dose your dog every three months with Arecoline, the vermifuge supplied with your dog license.

3. After handling animals, never put hand to mouth without washing.

4. Be sure children wash hands before every meal.

5. Wash thoroughly all vegetables and fruit eaten raw

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17.55a

An announcement from the N.Z. Department of Health

Poultry Feeding and Feeding Formulas

IN the early days of poultry keeping methods of feeding were more or less rough and ready, little attention being given to the nutritional requirements of the birds. Such methods may have been excusable as long as poultry were regarded as scavengers or as a means of using up inferior foods, or egg production was not expected in autumn and winter. Birds were allowed free run of the farmyard and paddocks and consequently were able by foraging to supplement their diet and balance their own ration. Circumstances today are very different and greater demands are made on a bird's egg-laying capacity, especially in autumn and winter. In this article J. Edmondson, Poultry Experimentalist, Department of Agriculture Poultry Demonstration Plant, Upper Hutt, discusses some aspects of poultry nutrition and the mashes used at the Plant, which have been designed for correct nutrition and profitable production.

POULTRY keeping can be an economic proposition only if the standard of nutrition ensures rapid growth, high egg yield, and low mortality at the lowest possible cost. Nowadays poultry are often kept under conditions where they are entirely dependent on the food fed to them by the poultry farmer and are unable to supplement their ration in any way.

As the intensive system gradually became popular more information was gathered about nutritional requirements of poultry. For example, birds deprived of sufficient direct light require the addition of vitamin D to prevent rickets (moreover, just any vitamin D would not do; it had to be D_3), and birds without access to fresh young green food require vitamin A to prevent nutritional roup, and so on.

Aspects of Nutrition

By keeping birds intensively and feeding them on controlled diets research workers have been able to study many aspects of nutrition and to estimate with accuracy the actual quantities of essential nutrients required. With the information available from nutritional research it is possible to compound rations which are "balanced"—containing proteins, minerals, and vitamins in the correct proportions for all classes of poultry under various types of management.

Different classes of poultry require different standards of nutrition. Breeding birds require a diet which will not only provide for efficient egg production in relation to the amount and cost of food consumed, but which will ensure good hatchability and the production of strong, healthy chicks having a carry-over through the egg of food nutrients necessary to give them a good start in life. Losses among young chickens can all too often be traced back to the nutrition of the parent. It may well be reasoned that a ration on which birds lay well and maintain good health and vigour would surely be good enough for breeding birds. This is not so. A classic example is that of vitamin B_2 (riboflavin), which when present in sufficient amounts to promote excellent egg production can result in disappointingly low hatchability.

Cost of Food

Since the cost of food represents about 60 per cent. of the total cost of production, the structure of a ration must be carefully examined with a view to effecting some economy. It should be realised, however, that the actual value of a ration cannot be measured in the price per ton. Its value can be assessed only by the cost of producing the table bird, the point-of-lay pullet, or the egg. Eight pounds of one foodstuff may be required for each dozen eggs produced, whereas another ration may produce the same number of eggs with 6lb.

Inferior food ingredients bought because they are cheap will prove expensive; they will reduce the cost of the diet, but will increase the cost of production. There is another danger in buying inferior food ingredients: When a mash is mixed to a particular formula based on known nutritive requirements and proved by feeding trials the use of inferior ingredients may make that mash totally unsuitable.

When the value of a ration is being considered the balancing of the ration does not merely imply the provision of food nutrients in correct proportion to meet the requirements of the stock. Such a ration could be mixed and yet be entirely unsuited for feeding on account of unpalatability or unsuitable physical condition.

Birds do not like finely ground, dusty mashes which tend to clog the beak and which because they are compact are likely to cause digestive disturbances. Such mashes would require the inclusion of a bulky food such as wheat bran or wheat pollard to help to improve texture and palatability. Coarsely ground cereal grains should be used in preference to finely ground grains. Wheat, for example, should be roughly broken, kibbled, or rolled; if it is reduced to a fine meal, it is unpalatable and more difficult to digest.

In recent years more attention has been paid to the nutritive contribution to a ration of cereal grains and their by-products. Wheat, oats, barley, and maize are the principal grains; the offals of wheat milling (bran and pollard) are also used extensively. These foods rich in carbohydrates are the main source of productive energy. It is commonly known that a balanced ration with a high-energy content is more efficient than a low-energy ration. It produces more eggs or more growth for each pound of food consumed. A high-energy mash is often referred to as a "high-efficiency" mash.

The energy content of a food is normally measured in calories per pound. The available energy contents of the more common food stuffs are as follows:—

	Calories per pound
High Energy	
Maize	1,145
Wheat	1,025
Medium Energy	
Heavy oats	817
Barley	811
Low Energy	
Light oats	642
Pollard	581
Bran	478

These figures can only be approximate, as variation will occur with samples of varying quality. Bran and pollard have a low-energy content. It is wise to remember that as a wartime measure the extraction rate in flour milling was increased and has remained at a high level ever since;

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consequently bran and pollard do not compare favourably with the pre-war products. There is much to be said for the use of coarsely ground cereals of high-energy content, bran and pollard being used more as agents for supplying bulk and improving the physical texture and palatability of a mash rather than as a main food ingredient. The advantage of using a balanced ration with a high productive energy content lies not so much in a higher egg yield (though this has often proved so in autumn and winter), but in the efficiency with which the food is utilised. The choice of cereals to include in a ration and the amount to use will depend largely on availability, quality, and price. It is preferable to use a mixture of cereals than to concentrate too much on any particular cereal.

Proteins

All cereal grains are deficient in protein both in quantity and quality; hence the need for supplementing them with protein-rich foods. In many countries protein-rich foods of animal origin such as meat meal, fish meal, and milk powders are in short supply and expensive; consequently, proteins of vegetable origin are used which are of poorer biological value. In New Zealand fortunately adequate supplies of meat meal and milk powders are available at prices which are reasonable compared with prices overseas, and it is not necessary to look further than these two products when compounding mashes.

Meat meal of good quality supplies valuable protein, minerals, and some vitamins and is extensively used to supplement the grain portion of a ration. Some samples of meat meal contain an appreciable amount of bone, which because of its phosphorus content can be harmful to chicks by upsetting the mineral balance of a mash and causing perosis.

Milk powders (dried skimmed milk and dried buttermilk) are extremely valuable foods. They supply riboflavin and other necessary vitamins. The mineral content and the complete nature of the protein in milk powders serve in a breeders' ration to guard against deficiencies which may upset hatchability and the rearability of the chickens. Milk powders are regarded as a wonderful food for building up young chicks and for maintaining resistance against disease. The inclusion of 5 to 10 per cent. in chick and breeders' mashes is the usual recommendation. Because of cost milk powders are not widely used in a growers' mash or a layers' mash, but for growing stock housed intensively or on limited range of poor quality or on "fowlsick" land its inclusion may well be justified. A number of poultry farmers use milk powder in mash fed to layers kept for commercial egg production and they claim to be more than satisfied with the results.

Protein requirements for chicks, growing stock, layers, and breeders are listed in Table 1. There is some misunderstanding about two points in the feeding of protein-rich foods. First, the total amount of protein in a diet consists of that contributed by the cereal portion of the ration—usually about 10 to 12 per cent.—plus protein supplied by the addition of protein-rich food. One per cent. of meat meal containing 60 per cent. protein would add 0.6 per cent. of protein to a mash. Secondly, recommended protein requirements refer to total food intake. A chick mash containing 18 per cent. of protein would be suitable for feeding as an all-mash ration. If roughly equal parts by weight of grain are fed with such a mash, the level of protein intake would be about 15 per cent. of total food eaten—a figure much below the desired level. Where grain is fed to chickens the mash used would need to contain about 23 to 24 per cent. of protein to give a protein level of total food consumed of 18 per cent.

The "watering down" effect of grain feeding applies equally to other food factors such as minerals and vitamins, which are added to balance a ration.

Minerals

In practice the only minerals which need to be considered are sodium, chlorine, calcium, and possibly manganese and phosphorus. This may seem an impressive list, but all are readily available.

Common Salt

Sodium and chlorine requirements are met if salt is included at the rate of ½ per cent. (8oz. to 100lb.) in an all-mash ration or double this amount (1 per cent.) in a mash where grain is fed.

Calcium

Two per cent. of limestone flour or oyster shell dust will normally meet the calcium requirements of chickens and growing stock. Layers and breeders require much more owing to the requirements for shells on eggs. As each layer's requirement will vary according to her rate of egg production, the usual method of supplying calcium is to feed, say, 2 per cent. in the mash and in addition supply limestone or oyster shell grit free choice so that each bird can balance its own requirements.

The calcium : phosphorus ratio is of some importance, because an excess of one if sufficiently marked will cause a deficiency of the other. The addition of large quantities of calcium will cause a depletion of available phosphorus, and an excess of phosphorus will cause a deficiency of calcium. Such imbalance will have a detrimental effect on bone formation. The optimum ratio of calcium to phosphorus for chicks is about 1½ : 1. The ratio of calcium to phosphorus for laying birds is higher, about 2½ : 1, but if limestone grit or shell grit is placed before layers at all times, they will consume what they require to establish a correct ratio.

TABLE 1—RECOMMENDED NUTRIENT ALLOWANCES FOR POULTRY
(Amount per pound of total food)

	Chicks	Growers	Layers	Breeders
Total protein (per cent.)	18	15	15	15
Vitamins				
Vitamin activity (international unit)	2000	2000	3300	3300
Vitamin D_3 (international chick unit)	135	135	340	340
Riboflavin (milligrams)	1.6	0.9	0.9	1.3
Minerals				
Calcium (per cent.)*	1.0	1.0	2.25	2.25
Phosphorus (per cent.)	0.6	0.6	0.6	0.6
Sodium chloride (per cent)† ..	0.5	0.5	0.5	0.5
Manganese (milligrams) ..	25	—	—	15

* Includes free choice calcium and calcium included in the feed.
† This value represents added sodium chloride (common salt).

Manganese

Where only a small amount of wheat offal is used in a ration or where meat meal contains an appreciable amount of bone there is a possibility of a marginal deficiency of manganese, particularly where the ration is for young chicks, as their requirement of manganese is much higher than for layers. Inclusion of manganese sulphate at the level of 4oz. to 1 ton of food will prevent deficiency. The difficulty of mixing such a small amount can be overcome by mixing the manganese sulphate in with the salt at the rate of 4oz. to 10lb. of salt. This mixture (manganised salt) is then used at the recommended level of ½ per cent. of total food intake.

Vitamins

If a normal ration consists of the usual cereal grains, offals, and protein-rich foods, only three vitamins are likely to be deficient—vitamins A, D_3, and B_2 (riboflavin). Vitamins A and D_3 can be obtained as fish oils, emulsions, and high-potency preparations in a stabilised form. As the potency of products varies according to make, it is advisable to follow the makers' instructions on feeding level and method of mixing. Compared with laying birds chickens and breeders have a particularly high requirement of riboflavin. If dried-milk products are fed with good, fresh green food or good dehydrated green food, no additional riboflavin is required. The riboflavin content of a ration can be readily increased by the addition of pure riboflavin, which is available on the market. Some manufacturers supply a vitamin supplement containing vitamin A, D_3, and B_2 in the correct proportions to satisfy nutritive requirements when used at levels they recommend.

For those who would like a simple method of making a quick check to

ensure that a mash is balanced nutritionally Tables 1, 3, and 4 should prove useful. Table 3 will also assist in the compounding of diets.

The protein level in the mash in Table 4 is good. The calcium : phosphorus ratio is satisfactory. The manganese deficiency will be corrected with salt with manganese sulphate added. The riboflavin content is only slightly below the desired level, and such a marginal deficiency would not produce ill effects under normal circumstances, but if the chicks were subject to any particular stress such as below average management, overcrowding, disease, etc., nutritive requirements would be increased and the reserve would not be there to meet the requirements. Pure riboflavin could be added as a safeguard, a slight increase in the amount of buttermilk could be made, fresh greens (which are a rich source of riboflavin) could be fed, or a high-quality lucerne meal could be added.

The food formulas in Table 2 are intended merely as examples of rations which may be relied on to give satisfactory results. It is assumed that the individual ingredients will be of good quality and correctly ground to ensure a palatable food, and that all ingredients will be thoroughly mixed to ensure even distribution through the mash.

Considerable modifications can be made to meet local conditions and such modification can sometimes have an over-all effect on the nutritive value of the ration. By using the tables given the effect of modification can be recognised and corrected. All formulas recommended are intended for birds kept in confinement. Less costly mashes can be made for birds having access to good pasture. However, as range conditions are variable and not dependable, any nutritional value derived from such conditions is preferably regarded as an "extra" in good feeding practices.

TABLE 2—FOOD FORMULAS USED AT POULTRY DEMONSTRATION PLANT, UPPER HUTT

	Breeders*	Chicks†	Growers‡	Layers§
	lb.	lb.	lb.	lb.
Bran	5	5	5	5
Pollard	10	10	10	10
Ground wheat (coarse)	37½	38	30	38
Ground barley	10	—	19	14
Ground maize	10	10	10	10
Ground oats	5	5	5	5
Meat meal (60 per cent.)	12	20	12	15
Buttermilk powder	7½	8	5	—
Oyster shell dust	2	3	3	2
Salt (manganised)	1	1	1	1
Vitamins A and D_3	As recommended by manufacturers			
	Per cent.	Per cent.	Per cent.	Per cent.
Approximate protein content	19	23½	18½	19

* To be fed with scratch grain; about 60 parts by weight of mash to 40 parts of grain. Clean oyster shell should be freely accessible.

† Designed to be fed with scratch grain; 60 parts of mash to 40 of grain. Depending on the growth of the chicks, the amount of grain may be gradually increased as they grow until at 8 weeks of age the grain and mash are roughly equal by weight.

‡ To be fed with equal parts by weight of grain.

§ To be fed with grain as for breeders; oyster shell grit free choice.

TABLE 3—AVERAGE PROTEIN, VITAMIN, AND MINERAL CONTENT OF COMMON FOOD STUFFS

(The figures in the first four columns represent the proportions of the food constituents in each 1 per cent. of the foods listed)

	Crude protein	Calcium (Ca)	Phosphorus (P)	Crude fibre	Vitamin A activity I.U./lb.	Vitamin D_3 activity I.C.U./lb.	Riboflavin mg./lb.	Manganese mg./lb.
Energy-rich foods								
Yellow maize	0.09	0.0001	0.0029	0.02	0-4000	—	0.60	2
Wheat	0.12	0.0004	0.0039	0.02	0-750	—	0.51	18
Oats	0.12	0.0010	0.0036	0.10	0-80	—	0.58	15
Barley	0.12	0.0005	0.0036	0.05	0-400	—	0.55	7
Wheat bran	0.15	0.0011	0.0121	0.09	0-150	—	1.34	54
Wheat middlings	0.16	0.0008	0.0093	0.07	0-120	—	0.74	54
Dried whey	0.13	0.0083	0.0070	—	—	—	12.90	6
Vegetable protein foods								
Extracted linseed meal	0.36	0.0033	0.0074	0.09	200	—	0.90	18
Pea meal	0.23	0.0012	0.0042	0.05	*	—	*	*
Bean meal	0.22	0.0020	0.0034	0.07	*	—	*	*
Animal protein foods								
White fish meal	0.60	0.0500	0.0360	—	—	—	4.20	18
Meat meal (60 per cent.)	0.60	0.0500	0.0300	—	—	—	2.80	8
Meat and bone meal (50 per cent.)	0.50	0.1020	0.0500	—	—	—	2.60	5
Blood meal	0.81	0.0030	0.0030	—	—	—	0.90	9
Dried skimmed milk	0.35	0.0127	0.0096	—	—	—	9.30	0.3
Dried buttermilk	0.34	0.0156	0.0105	—	—	—	15.00	0.2
Mineral supplements								
Ground limestone or oyster shell	—	0.3920	—	—	—	—	—	—
Steamed bone flour	—	0.3130	0.1449	—	—	—	—	1
Miscellaneous								
Lucerne meal	0.15	0.0144	0.0021	0.20	113,636	—	7.9	12

* Not available.

TABLE 4—CHICK MASH USED AT POULTRY DEMONSTRATION PLANT

	lb.	Protein per cent.	Calcium per cent.	Phosphorus per cent.	Riboflavin mg./lb.	Manganese mg./lb.
Bran	5	0.75	0.006	0.061	7	270
Pollard	10	1.60	0.008	0.093	7	540
Ground wheat	38	4.50	0.015	0.148	19	666
Ground maize	10	0.90	0.001	0.029	6	20
Ground oats	5	0.60	0.005	0.018	3	75
Meat meal (60 per cent.)	20	12.00	1.000	0.600	56	160
Buttermilk powder	8	2.72	0.125	0.084	121	2
Oyster shell dust	3	—	1.176	—	—	—
Salt	1	—	—	—	—	—
Vitamins A and D_3		At makers' recommended level				
	100	23.07	2.336	1.033	219	1,733
60lb. mash	60	13.84	1.402	0.621	132	1,041
40lb. wheat	40	4.80	0.016	0.156	20	720
Total food	100	18.64	1.418	0.777	152	1,761

Dehydrated Green Foods

Reference has been made to dehydrated green foods. Articles on nutrition in countries overseas show that the use of alfalfa (lucerne) meal and grass meal is very popular. The chief value of these foods lies in their mineral, xanthophyll, and vitamin content, particularly their provision of carotene (from which a bird can make vitamin A) and riboflavin. Xanthophyll is an important constituent, and as it is the pigment responsible for imparting good yolk colour, it is particularly useful to the egg producer who does not feed fresh greens to his layers.

Unfortunately, many of the samples of lucerne meal produced in New Zealand are of poor quality. Much depends on the stage at which a lucerne crop is cut. The younger the growth is the more nutritious is the meal. If a sufficiently high-quality meal can be obtained, its inclusion in a mash is well justified; 5 per cent. of such a meal would act as a nutritional extra, particularly in breeders' and chick mashes, and reduce the labour of supplying fresh greens to layers to obtain good yolk colour.

Hard Grit

Though it is not a food nutrient, hard grit is essential to poultry and should be available to stock of all ages. Because of its grinding action in the gizzard hard grit enables more complete digestion of food, which is consequently used with greater efficiency, resulting in a lower food requirement. Hard grit is given in addition to limestone or oyster shell grit, which are of no value as grinding agents.

Work in the Home Garden

[*Green and Hahn*

By A. G. KENNELLY,
Horticultural Instructor, Department of Agriculture, Dunedin

JANUARY is usually a favourable month for gardening. Both soil and air temperatures usually favour vigorous growth and in most districts soil moisture is usually more satisfactory than in February or March. In many districts January provides the last opportunity for sowing peas, dwarf beans, carrots, beetroot, and swedes to mature before winter. Spinach, silver beet, turnips, radishes, lettuces, "spring" onions, and parsley may be sown now, or where conditions are likely to remain favourable the sowing deferred until next month. Continuity of supply should be the aim of every home gardener, and failure to plant winter greens during December or January may in many districts result in a break in continuity of supply during winter or early spring.

WHERE crops such as savoy cabbages, broccoli or winter cauliflowers, curly kale, brussels sprouts, and leeks have not yet been set out the planting of a suitable selection to provide supplies from late autumn until the new season's crops have matured in late spring should, in all except the most favoured districts, be done during the month.

Often the difficulty in small gardens is to find the space to make summer sowings and winter plantings as well, because by mid-January most home gardens are filled with such vegetables as dwarf and climbing beans, carrots, potatoes, shallots, peas, spinach, onions, turnips, lettuces, radishes, and various kinds of beet, all of which are easily grown for harvesting at this time of year. Pumpkins, marrows, cucumbers, tomatoes, and sweet corn should also be ready for harvesting toward the end of the month in most districts.

Staked varieties of tomatoes should be pruned regularly and tied up as they develop. In the more humid districts plants should be sprayed with a suitable certified fungicide, combined, where caterpillars are troublesome, with an insecticide such as DDT. Successional sowings of salad vegetables should be made and celery set out.

All members of the cabbage family should be sprayed or dusted with an insecticide such as DDT to protect them against caterpillars, or with nicotine sulphate or lindane against aphids. Potatoes should be earthed up and in the more humid districts sprayed with a certified fungicide against late blight.

Ground that will not be required for some time should be sown with a cover crop. Plant foods are then less likely to be leached out of the soil and its organic content can be built up. The hoe should be used often and vigorously in January, because weeds are easily killed with it in the comparatively dry conditions which are usual then.

Beans

Where earlier-sown crops of beans are now falling off in yield, dwarf or french beans can now be sown for late-autumn use. In most southern districts it is advisable to sow in the earlier part of January; the measure of success obtained usually depends largely on favourable autumn weather. In more favourable districts February sowings of quick-maturing varieties usually do well.

Grown under good conditions, dwarf beans come into bearing in about 8 to 10 weeks. Late-January sowings in most districts should be in warm, sheltered situations, because even relatively light frosts stop the development of beans. Though beans grow in a fairly wide range of soils, they need a constant moisture supply.

The soil should be well worked before sowing. A friable well-drained loam, reasonably supplied with organic matter suits the crop well. Beans are not usually regarded as gross feeders and generally on reasonably fertile soils only moderate fertiliser applications are needed. On many of the richer soils that are well supplied with nitrogen, a dressing of superphosphate alone, at about 2oz. per square yard, gives satisfactory results, though on poorer soils a complete fertiliser is usually advisable. As beans are not deep rooted, water should be given if conditions are dry, as otherwise the plants may be slow in development.

Seed is best sown about 2in. in the bottom of a trench taken out with a hoe about 2in. deep. January sowings in dry weather should preferably be made a little deeper than early sowings. Rows should be 24in. to 30in. wide. Good varieties include The Prince and Tendergreen.

Diseases

The principal diseases of beans in New Zealand are anthracnose, bean mosaic, and halo blight. The last shows as small, greasy, water-soaked spots $\frac{1}{8}$in. to $\frac{1}{4}$in. in diameter on leaves, stems, and pods. It causes dwarfing or death of young plants or unsightly lesions that may make pods unusable. Halo blight is seed borne and in moist conditions infection is rapidly spread by rain splashes or insects.

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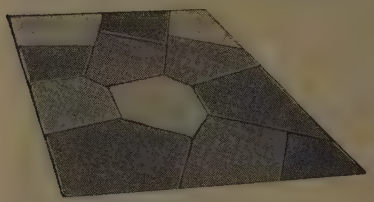

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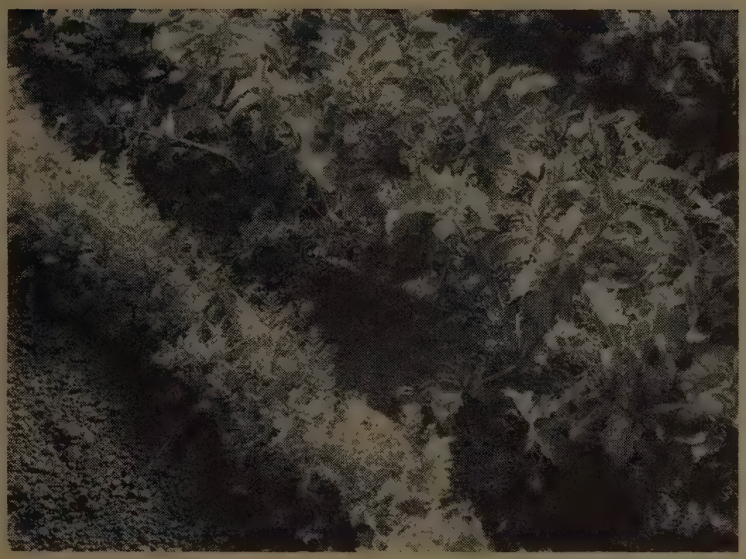
Anthracnose is a fungous disease which forms dark brown, sunken lesions on pods and stems and a black discoloration of midribs and veins of the leaves. Anthracnose is also seed carried and though in New Zealand it does not normally cause as much damage as halo blight, it occasionally makes a crop unfit for harvesting.

Bean mosaic is quite distinct and a severe infection is characterised by a dark mottling and distortion of the young leaves. Stunting of plants is common in susceptible lines and pods may be small, reduced in number, or fail to develop. Many crops have a small number of infected plants, but only rarely is the amount sufficient to bring about serious crop loss. This disease is also seed carried and can be transmitted from diseased to healthy plants by rubbing and by insect pests.

Methods of control of bean diseases include use of disease-free seed, sprays, and seed dusts (copper oxychloride has given fairly good results) and the use of resistant varieties. Generally the white-seeded pole beans are moderately resistant to halo blight.



[*Green and Hahn*

Root crops such as parsnips and carrots are among the best vegetables for winter use. Sowings can still be made in most districts in January.

Carrots

A sowing of carrots can be made in January where soil conditions are favourable. The intermediate or stump-rooted kinds are usually preferred for late sowings and usually result in the production of good roots in late autumn, whereas roots from earlier sowings have by that time usually become large and rather coarse.

Late sowings are sometimes less subject to the attack of the carrot aphid and the carrot rust fly and are therefore preferred in some districts. In southern districts the situation and autumn weather must be favourable and the seed should be sown without delay in soil that is in good condition and worked to a fine tilth.

Many home gardeners have difficulty in growing carrots, though in most gardens carrots should be one of the most productive and important crops, as they can be used at various stages of maturity. If sowings are suitably spread, carrots should be available in most good-sized gardens during most of the year. Carrots have a high food value and their vitamin content is important in nutrition.

Carrots are not difficult to grow, but the soil must be friable, moist, and well drained and the plants must be kept free from insect pests. Light, sandy loams produce the smoothest and straightest carrots, but all good loams apart from the heavier clay loams can be improved to produce satisfactory crops. Peat soils are usually highly productive.

Difficulty is commonly experienced by home gardeners in growing carrots in the older, sometimes rather light soils that have been worked for many years without having had much organic matter such as compost or farmyard manure applied to them. Trouble is commonest in the smaller garden, where cropping is usually continuous and good crop rotation with adequate green cropping is difficult.

Carrots grow well in soils that were heavily dressed with organic manure for the previous crop. The application of heavy dressings of organic manure just before sowing is not advised, though results may be satisfactory if the manure is well rotted and mixed throughout the root area. The incorporation of lumpy masses of fresh or only partly rotted manure is especially to be avoided, as local conditions may become highly acid and the carrots coming in contact with the manure may become forked or distorted.

Soil Preparation

Soil preparation for the seed-bed should be thorough. Lumpy soil should be pulverised until a fine tilth is obtained.

Results are likely to be better on most soils if mineral fertiliser is used to supplement the organic manure in the soil. A complete fertiliser (one made up of nitrogen, phosphate, and potash) is likely to give best results on most soils, but good responses are obtained on many New Zealand soils from superphosphate alone. Superphosphate can be worked in at about 2oz. to 3oz. to the square yard during the final cultivation.

Carrot seed is fairly small and should be sown only ¼in. deep in rows 12in. to 15in. apart at about 15 to 20 seeds to each foot of row. On soils that tend to form a crust after rain the soil over the seed should be kept loose to facilitate the emergence of the tiny seed shoots.

Control of Aphids

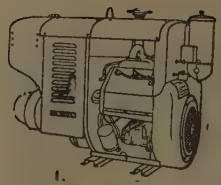
Aphids or green fly are commonly the most troublesome pests on carrots, and home gardeners sometimes have difficulty in detecting them. The foliage should be examined regularly from the seedling stage so that spraying can be begun as soon as the aphids appear. Usually the first and most readily noticeable sign of aphids is the presence on the carrot foliage of tiny whitish or greyish flecks rather like cigarette ash, which are the cast-off skins of the aphids.

On young plants the presence of even a few aphids soon saps their vigour. In warm weather the leaves of even large infested plants quickly lose their natural colour; if infestation is heavy, plants droop and growth may cease.

Aphids can be controlled by lindane dust or spray or by spraying on a warm, still day with nicotine sulphate at 1 fl. oz. (approximately 7 teaspoons) to 5 gallons of water, plus a little soap or lime to activate the nicotine. Alternatively, HETP can be used at the same strength, but without soap or lime.

Celery

Though it is useful for soups and stews, celery is most popular as a salad vegetable. Most home gardeners



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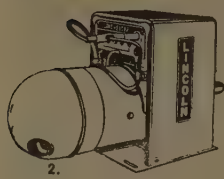

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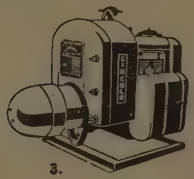

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like to set out plants as early as possible and though plants can be set out earlier where temperatures are high enough, December and January are the preferred months for planting. Later planting is only practical where autumns are mild.

Home gardeners sometimes defer planting until after the holidays so as to be able to attend to the plants throughout their growing period, because for good growth celery should have a continuous and fairly high supply of moisture and because in most districts regular spraying is necessary to keep the plants free from leaf diseases. However, temperatures are of first importance. If they are not high enough during the seedling stage, plants will fail.

Home gardeners usually buy young celery plants from seedsmen or nurserymen, as the seedlings of self-blanching celery need to be raised in consistently higher temperatures than prevail in most districts without the aid of a glasshouse or heated frame. Most varieties of self-blanching celery begin to develop seed stalks if they are subjected for a week or more to temperatures of from 35 to 50 degrees F.

Manures

Though celery is more tolerant in the seedling stage of insufficiencies of moisture, nutrients, light, and space than it is of low temperatures, a good deal of skill is needed to grow self-blanching celery well, as it needs a rich soil, ample moisture, and good drainage. Organic manure such as farmyard manure or blood and bone are preferred, but where organic manures are not available in sufficient quantity it is usual to supplement them with mineral fertilisers. Nitrogenous and phosphatic fertilisers are usually applied and give improved growth on most soils. Potash is less often applied, though it is probable that it would improve quality of celery on many soils.

A complete and balanced fertiliser made up of 2½ parts of sulphate of ammonia, 2½ parts of superphosphate, and 1 part of sulphate of potash applied at about 2oz. to 4oz. to the square yard according to soil fertility should promote good growth. Manure should be mixed into the top few inches of the soil before the plants are set out; deep placement is not advisable, as the roots of celery remain near the surface.

Soil moisture is as important as soil nutrients in the growing of self-blanching celery, and to facilitate watering in soils that may dry out plants can be grown in shallow trenches.

Non-self-blanching Types

The types of celery which are not self-blanching are usually considered less difficult to grow than the self-blanching types and are considered by many to have a superior flavour and texture. A well-grown head of celery should be made up solidly of large, thick-fleshed, succulent leaf stalks, and the characteristic celery flavour should be strongly developed.

Planting in a trench is specially favoured by those who blanch the older, non-self-blanching varieties by moulding the earth up the stems, but it is practicable only where the soil is deep and well drained and does not contain too much organic matter. Non-self-blanching celery is less subject to leaf spot disease than self-blanching kinds.

Spraying

Where leaf-spot disease is prevalent plants should be sprayed with a fungicide such as captan or a copper fungicide such as bordeaux mixture or copper oxychloride at intervals of about 7 to 14 days. Control of the disease may be obtained with less frequent spraying where humidity is low or a good coverage of spray residue remains on the plants for a fairly long time.

Cucurbits

Trailing leaders of cucurbits (marrows, pumpkins, cucumbers, and melons) should be stopped (pinched off) to encourage the growth of laterals and to keep plants within bounds. Cucumbers should not be left on the vines after they reach maturity or the flavour is likely to become bitter.

Cucurbits grow quickly in warm conditions if the soil is fertile and friable. A sufficiently high soil temperature is very important, as cucumbers, marrows, pumpkins, and melons make little growth in soil temperatures below 50 degrees F. Light soils that have been well mulched or have had plenty of organic matter worked into them are excellent for cucurbits if moisture is adequate and drainage is good.

[*Green and Hahn*

Cucumbers should be gathered before they are fully mature.

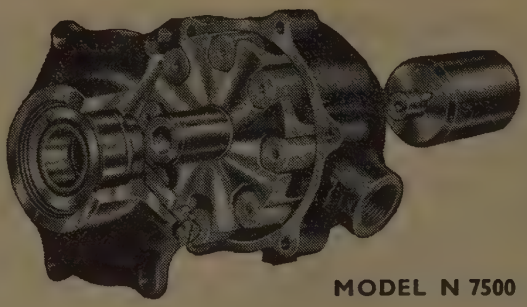
Cucumbers are more tender than tomatoes or sweet corn and as the leaves are readily scorched by sun or wind in exposed situations, they should preferably be grown between rows of taller plants such as peas or sweet corn, which will provide some shelter. Cucurbits are usually grown either on hills or in groups of several plants set fairly closely together, in single rows, or, in large gardens, occasionally in double rows. Only shallow hoeing round the vines should now be necessary and if this is done regularly, weeds will be destroyed when they are small.

Except where the soil is very fertile the yield is usually improved by a topdressing of sulphate of ammonia or blood and bone. Where conditions are dry the manure can be applied in liquid form, either made from animal manure or sulphate of ammonia at 1oz. in about 2 gallons of water.

Kohl Rabi

Kohl rabi is not as commonly grown in the home garden as it deserves to be. A member of the cabbage family it combines the flavour of both cabbage and turnip. It is grown for its bulbous "root", which forms somewhat after the manner of a turnip, except that the whole bulb is above the ground, as the "root" is actually an enlarged stem. To produce succulent, tender bulbs, kohl rabi should be grown quickly and should not be allowed to grow beyond 2½in. to 3½in. in diameter, because if left to reach maturity, it becomes tough and stringy.

Kohl rabi grows well in a soil that is well drained and reasonably rich in humus. Though it is usually classed with turnips, it does well under a wider variety of conditions than suits



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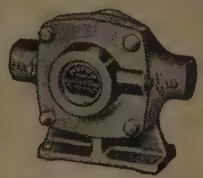

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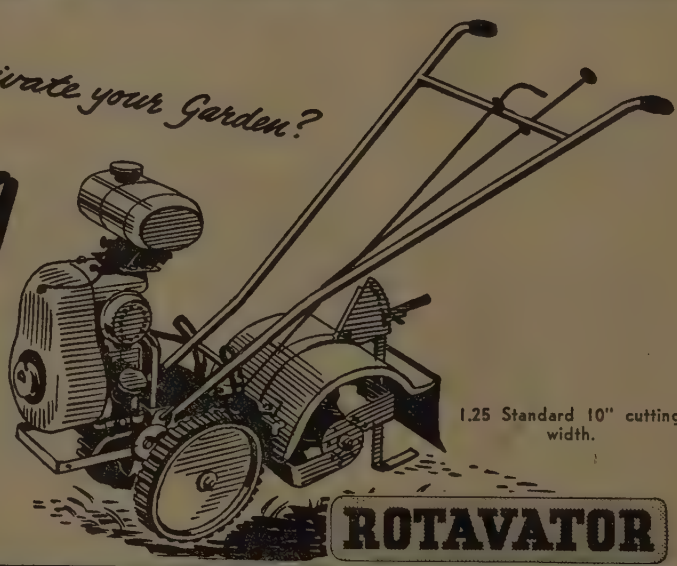

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turnips. Broadly kohl rabi requires conditions similar to those needed for satisfactory growth of summer and autumn cabbage. It is grown largely as a cool-weather vegetable, but is very useful as a substitute for turnips during hot, dry weather, when turnips are likely to fail.

Kohl rabi should not be permitted to become too dry or it may have a bitter flavour. January sowings are often favoured. Seedlings transplant well, but it is usually preferable to sow seed ½in. deep in rows 12in. to 15in. apart and later thin the plants to stand 6in. to 9in. apart in the rows rather than to transplant them. Plants mature in from 8 to 12 weeks from sowing. Bulbs do not keep well in storage.

Only a few varieties are listed and under good conditions they are all good. They include White Vienna, Purple Vienna, and Short Top Green.

Kumaras

Kumara runners should be lifted periodically to prevent them from rooting. If they are lifted regularly, the vines will not mat together and are much easier to turn. The commercial culture of kumaras is confined to the northern parts of New Zealand, though they can in some seasons be grown in warm, sheltered areas as far south as Christchurch.

Lettuces

Where a succession of lettuces is desired seed in January is best sown in a situation where the crop is to mature. Though lettuces, like such plants as cabbages, beets, and tomatoes, transplant readily, their ability to withstand transplanting varies with conditions. When conditions are good damaged and destroyed roots are normally replaced quickly by new growth. In January, when conditions are often dry, a check of transplanting, even if the work is done with the greatest care, is likely to be so severe that sowing in the place where the plants are to mature is preferable.

During the warmer part of the year lettuces are grown in practically all home gardens and with successional sowing or planting they can be grown in most districts to be available throughout the year. Plants must be grown quickly if the leaves are to be crisp. Slow growth or checks to growth cause the flavour to be bitter, and though varieties of lettuce have been developed that have considerable tolerance to hot weather, high-quality lettuce can be produced consistently only where the temperature of the soil and the air is moderately cool while the crop is maturing. Fluctuating high and low temperatures do not permit good growth. With most varieties high temperatures tend to give early seed head development, bitter flavour, and poor hearts.

Lettuces mature in from about 2 to 5 months according to growing conditions and varieties, but conditions have to be exceptionally favourable to produce good lettuces in 2 months. Sowings made to give plants that will mature late in the season should not be large, because though lettuces will tolerate fairly heavy frost, plants severely frosted at or near maturity will have their outer leaves damaged and the plants will be subject to slimy rot.

Maturing plants will grow very little during continuous frosty weather and though the heads may become solid, they will remain small and may suffer

[*Green and Hahn*

Leeks, like savoy cabbage, kale, and winter cauliflower or broccoli, are usually planted out in January.

injury that makes them wasteful in preparation for the table. In late January transplanting rather than sowing is advisable in some colder districts.

Manuring

The root systems of lettuce are relatively shallow and though excess water is not desirable, plants should be set out in a moist soil that does not dry out. Practically all soils are improved for lettuce growing by the addition of organic matter. The amount needed varies with the soil type. Loss of organic matter owing to decomposition is rapid in light soils, but heavy soils also need organic matter, as it improves aeration and water movement.

Well-rotted farmyard manure gives excellent results, but very heavy dressings, particularly when the weather is most favourable for growth, may result in loose heads. Where sufficient farmyard manure, compost or similar material cannot be obtained, soil can be improved by growing a green manure crop and digging it in early enough for it to rot down before the lettuce is set out.

Unless rotting is fairly complete before the plants are set out growth may be checked through depletion of the nitrogen in the soil by the bacteria that cause decomposition. On very heavy soils, where the danger of depletion of the nitrogen supply may be outweighed by the advantage of improving the physical condition of the soil, it may be advisable to allow the green crop to mature fully before digging it in. A mature crop contains more fibre than an immature crop and when incorporated into the soil is likely to be effective for longer.

If additional fertiliser is needed, blood and bone is likely to give good results on most soils. Alternatively a so-called complete mineral fertiliser can be made by mixing 2½ parts of sulphate of ammonia, 2½ parts of superphosphate, and 1 part of sulphate of potash. The complete fertiliser is much more concentrated than blood and bone and it can be applied at about half the rate.

Application can vary from about 2oz. to 6oz. to the square yard according to the fertiliser and the fertility of the soil. In home gardens a manure which is rich in nitrogen is usually needed most for lettuces. However, too much nitrogen may result in poor hearts and loose leaves.

Soil should be worked to a fine tilth for sowing, as lettuce seed is small and germination is relatively weak. Seeds should be sown thinly (as the first thinning should leave plants about 6in. apart) about ¼in. deep in rows 12in. to 15in. apart.

Popular varieties include Great Lakes, Webbs Wonderful, and Imperial 615.

Mustard Greens

Mustard greens are quick maturing where conditions are favourable and deserve to be more widely grown where there is a demand for green leafed vegetables. Alternative names for mustard greens are Chinese mustard and mustard spinach. There are several kinds, the loose-leafed sorts being represented by the broad-leafed varieties such as Florida broad-leafed and New Chinese, and the curled types by varieties such as Southern Giant Curled.

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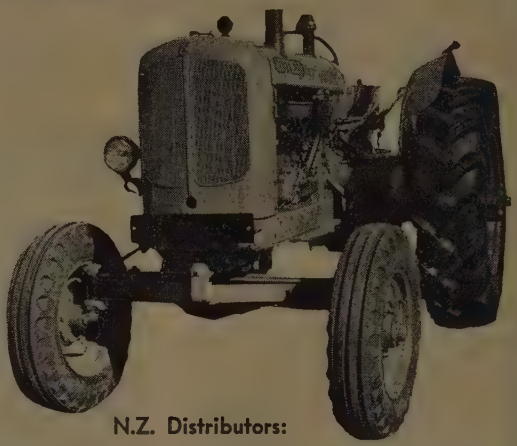

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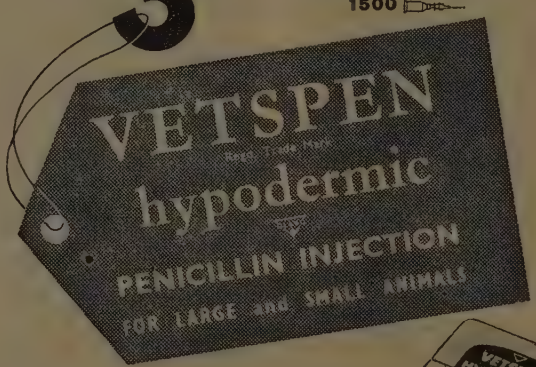

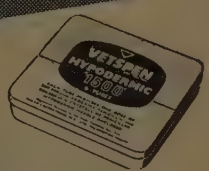

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The variety Tendergreen, which is commonly called mustard spinach, is very good, as it has dark green, rather thick, fairly smooth, spoon-shaped leaves and combines the flavours of mustard and spinach. It can be sown in January even in the hotter, drier districts. The other varieties are less useful for this purpose.

A hearting variety (Hearting Chinese Mustard) is also sold by some seedsmen. Its leaves grow 12in. to 14in. long and the hearts, which are about 8in. across, blanch well.

The flavour of the varieties mentioned is mild and though some varieties will grow fairly well in the poorer soils, best results are obtained in rich, moist soils. The open varieties in particular are a good substitute for spinach and should be gathered in the same way, though the leaves are larger than the largest spinach leaves.

If thinning of the crop is left until a late stage, the plants removed will provide an early source of young leaves, and later when the remaining plants are large enough a few of the largest leaves can be taken off as they develop. They can be removed with the fingers or a pair of scissors and should be used when young and tender. Mustard greens can be cooked like spinach or used in salads.

Seed should be sown ¼in. deep in rows 15in. apart. Plants of open-leafed kinds should be thinned to 6in. apart and the hearting kind to at least 9in. apart.

New Zealand Spinach

New Zealand spinach is not a true spinach, but is invaluable for use in hot, dry, sunny situations and is often preferred because it lacks the peculiar bitterness of true spinach. It is a half-hardy trailing annual with large, succulent leaves and is very useful to provide autumn greens from a January sowing.

Growth is rapid in favourable conditions and it responds best to a light, fertile soil in a sunny position with adequate moisture. It is harvested by pinching off about 3in. of the growing tips, which forces new shoots to develop, so that when established the plant has a multitude of tips for gathering.

New Zealand spinach plants spread over quite a large area and should be given a spacing of at least 2ft. each way. Seed, which usually germinates slowly, should be sown 1in. to 1½in. deep; 2 or 3 seeds should be sown together at each spacing and the weaker plants removed after establishment. Plants mature in about 6 to 8 weeks.

Onions

Correct harvesting has an important bearing on the keeping quality of onions. The most suitable time for harvesting should be determined by factors such as the weather, the condition of the crop, and whether onions are for fairly immediate use or for long keeping.

If bulbs are to be used almost immediately, they should be lifted as required when they have reached maximum or almost maximum growth. Onions for long keeping should preferably be cured, and in this condition the roots and tops should be dried off and the bulbs should be so hard that they are not readily dented by the thumb.

Readiness of onions for harvesting is indicated by drooping of the tops just above the bulbs while the leaves are still green. Gradual dying back from the tops of the leaves while the necks remain rigid, erect, and thick is an indication of abnormal ripening and such onions usually do not keep well. Insect pests or a poor strain of plant may be responsible. There is likely to be a percentage of this type in practically all crops.

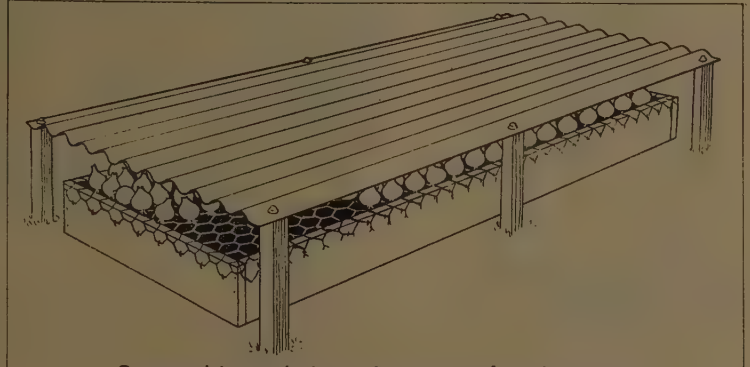
The roots of healthy, well-grown onions ready or nearly ready for harvesting lose their hold on the ground as they gradually die and the necks of the stems soften owing to the transference of the soluble solids of the leaves into the bulbs, until the outer succulent layers of the bulb nearly close the opening on the inner scales. After the necks shrivel the leaves gradually turn yellow and dry off, even if the onion is not harvested.

If onion bulbs dry off prematurely, the necks of the bulbs may remain open and allow various rot organisms to enter. Premature drying off of the bulbs may be due to injury by heavy infestations of thrips or by damage to the roots by hoeing. Growers sometimes hoe off the roots to cause premature death of the leaves and thus speed the drying off of the crops so that harvesting can proceed.

Except in a few areas conditions in New Zealand are rarely ideal for harvesting and curing onions and it may not be possible to wait until the crop reaches the best stage for harvesting. Early frost is a risk in some districts. Light frosts do not harm onions, but heavy frost may cause severe injury.

[*Photo News*

One of the best ways of storing onions is to string them and let them hang in a cool, airy building.



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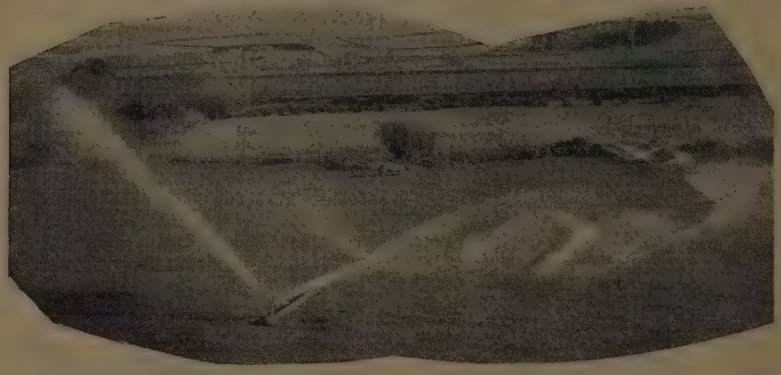

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Onions with thick necks or that have not closed at the necks or bulbs left to dry that have been exposed to showers or to heavy dews are likely either to rot or take root again. Where conditions for drying are not likely to be suitable onions should be dried or cured under cover.

Drying or curing usually takes 3 to 4 weeks. In districts where a spell of fine weather is likely, bulbs can be left on the ground. The tops should be left on to give them some protection from the sun. If rain falls or there are heavy dews, bulbs should be turned to enable them to dry evenly and to check rots, sprouting, or discoloration by the wet soil. After drying it is usual, though not essential, to top the onions by cutting or twisting the tops ¾in. from the bulbs. Twisting is preferable, as it closes the tops of the bulbs and the twisted leaves act as a barrier to the entry of rotting organisms. Alternatively the bulbs can simply be gathered when dry and packed in open-mesh bags or in shallow open boxes.

Though more space is needed for untrimmed onions, the tops are useful for cushioning the bulbs during handling and also in retarding the progress of rots that may develop. Where the weather is not favourable for curing in the field or where varieties that are difficult to cure, such as some of the white onions, are grown bulbs are better dried in an airy shed or on a shelter such as that shown in the diagram on page 577 before storage in open-mesh bags or boxes.

Where time can be spared stringing the onions as is shown in the illustration on page 577 is an excellent method of handling stored onions.

Peas

In many districts January is the latest month for sowing peas which will mature before winter. In the cooler districts a quick-maturing variety should be chosen and in most southern districts it is advisable to sow early in the month. Peas thrive in cool but not cold conditions, and a moist, deeply cultivated, well-drained soil containing adequate humus is best.

Soil preparation should be thorough. The ground should be deeply dug and where necessary organic material such as compost or farmyard manure should be incorporated, preferably some time before sowing, though peas usually do best following a crop that was well manured with organic and inorganic manure.

The addition of superphosphate at 1oz. to 2oz. per square yard has proved beneficial on many of the heavier soils that have been kept in good condition by adequate manuring with organic material or by the digging in of green crops, but on the lighter soils a complete fertiliser is likely to give better results.

Only moderate fertiliser applications are advised on soils in reasonably good condition. Too-heavy manuring, particularly with nitrogenous organic manures, tends to promote excessive vegetative or straw growth and makes the crop more liable to disease.

[*Green and Hahn*

Sweet corn should be picked as soon as it is ready and used soon afterward.

Lime is essential on most soils and can be supplied by an annual dressing of 3oz. to 4oz. of carbonate of lime per square yard.

Seed Sowing

Seed should be sown in V-shaped or broad, flat drills, usually drawn out with the hoe. Drills should be 2in. to 3in. deep, except where conditions are hot and dry, when they should be considerably deeper so that though the seed should not be covered with more than 2in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very important where conditions are dry or where heavy wind is likely, as the plants can to some extent be gradually earthed up the stems as they develop. Dwarf varieties should require no other support.

Protection of newly emerged peas against birds is essential in some districts, though birds are mainly troublesome in early spring, when food is scarce and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire.

There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime, sulphur, or superphosphate gives varying degrees of protection. Cotton stretched over the shoots is also effective if a num-

ber of strands, which may be criss-crossed or stretched in parallel lines, are used.

Varieties

Most seed catalogues give a list of varieties with heights and the approximate number of days each variety requires to mature. Popular varieties include the quicker-maturing varieties Little Marvel and William Massey and the intermediate varieties Victory Freezer, Green Crop, and Greenfeast.

Potatoes

Main-crop potatoes should be kept weed free and well moulded to prevent greening of tubers and their infestation by potato tuber moth larvae, but deep hoeing should be avoided, as the roots may be damaged and the soil dried out excessively.

Potatoes are mature when the skins of the tubers are firm and do not rub off easily. While top growth is healthy and vigorous tuber development will continue.

Early potatoes are usually dug before they are fully matured, but main-crop potatoes are best not dug until fully mature. The tops give the first indication of crop maturity and should be watched closely, as there is rarely any advantage in leaving the crop undug once maturity has been reached.

In districts where crops are likely to be attacked by late blight, they should be sprayed with bordeaux or other certified fungicide. To this spray can be added an insecticide, such as DDT, for the control of the potato tuber moth.

Parsnips

Though in southern districts, October is the preferred month for sowing parsnips, they will mature from later sowings in districts having a sufficiently long mild autumn. January sowings are satisfactory in many districts. The greatest value of parsnips lies in their use as a winter vegetable, as they stand well. Provided the soil is well drained, they rarely suffer harm even if left in the ground in the severest winters. Though it is generally said that the quality of parsnips is better after they have been subjected to frost, it is low temperatures, not necessarily frosts, which improve quality.

Parsnips are very sensitive to soil acidity and in most gardens the ground where they are to be sown should be dressed with lime at 3oz. per square yard at least, if a dressing has not been applied during the last year. In high rainfall areas the rate should be increased.

Like most other taprooted vegetables parsnips should be kept growing steadily if quality and yield are to be good, and a deep, friable, well-drained, deeply cultivated soil that is well supplied with humus is best. Parsnips do best in soil in which the organic manure has been applied to the preceding crop.

Seed should be sown ¼in. to ½in. deep in rows 15in. apart and the plants thinned to 4in. to 8in. apart, unless very large specimens are required, as soon as they are established. If the plants are first thinned to only 1in. or 2in. apart, the final thinning can be used in soups or stews.

Popular varieties include Hollow Crown and Ox Heart.

Sweet Corn

The first heads of sweet corn mature in many gardens toward the end of January or early February. Sweet corn is not a hardy vegetable; it thrives in warm, sunny conditions, and within limits the higher the temperature is and the more sunlight it receives the more likely it is to succeed. It can be grown in most districts in New Zealand, as it is less sensitive to cold than either the tomato or the snap bean, but it is not much grown in gardens in far southern districts. Sweet corn is not specially sensitive to drought and usually bears earlier on light, sandy, or peat soils.

Suckers often develop at the bases of plants during January and February and home gardeners sometimes remove them in an effort to encourage early development of the cobs and to increase their size, but usually the practice is more likely to result in loss than gain. The nutrients used by the suckers differ from the compounds that go to the development of the cobs. Removal of large suckers results in loss of plant tissue which is capable of elaborating plant nutrients into substances which go to the development of cobs. It may also result in serious plant damage.

Sweet corn is at its best for only a short time, especially with early varieties. Cobs should be harvested in the milk stage while they are plump, juicy, and firm and the silk is fairly dry. The cob can be tested by pressing the thumb nail into one of the kernels. If a milky substance is forced out, the cob is suitable for harvesting; if a doughy substance comes out, the corn is usually considered over-ripe.

Corn should be used as soon as convenient after harvesting, because its sugar content changes to starch within about 36 hours. For those who appreciate corn at its best that is a good reason for growing corn in the home garden rather than buying it. If corn is not to be used soon after harvesting, it is best cooled and held at as near freezing point as possible, as then loss of sugar content is greatly retarded.

Home gardeners used to grow corn on "hills", but it is now generally agreed that there is little justification for the practice, as the raised soil surface about the corn tends to shed rain and makes watering difficult. Earthing up the stems of tall varieties is justified where winds are boisterous and the plants are not firmly established. It is a good plan, however, to grow corn in clumps, as corn is wind pollinated and pollen distribution is best where the plants stand in blocks.

Winter Greens

Winter greens such as savoy cabbage, cauliflower or broccoli, fine-leafed kale, and leeks should be set out in most districts in January, if this has not been done. Where autumn conditions are mild February planting is usually satisfactory.

Pests such as caterpillars can be controlled readily by spraying with DDT or DDD. Aphids and thrips can be controlled by using nicotine sulphate, lindane, or HETP sprays.

If conditions are dry, the plants should be watered, and in the poorer soils liquid manure made from animal manure or sulphate of ammonia at 1oz. to about 2 gallons of water should give improved growth. Alternatively, the soil can be topdressed with sulphate of ammonia at about 1oz. to the square yard. In exposed situations it may be advisable to support brussels sprouts with stakes.

EDITOR: A. G. G. HILL

THE JOURNAL OF THE BRITISH GRASSLAND SOCIETY

This Journal is a medium for the publication of the results of research and practical experience in the realm of Grassland Husbandry.

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Manurial Treatment of Playing Areas

By C. WALKER,
Assistant Fields Superintendent, Department of Agriculture, Palmerston North

TURF for playing areas can be broadly classified into two types: That consisting of fine grasses required for such games as tennis, bowls, croquet, and golf, and that of coarser grasses more suited to winter sports such as football and hockey. Whatever the purpose, the aim should be to prepare a uniform, dense, resilient, and hard-wearing sward. Such conditions can be created, and probably the main factor in bringing them about is a manurial programme that aims at encouraging desirable grasses and suppressing clovers, weeds, and worm activity. Such manuring must use acidifying fertilisers which promote a tough type of sward on which growth is relatively slow but within which a high fibre content is built up to withstand hard wear.

TO achieve this the modern methods for high grass production have to be reversed. Whereas the dairy farmer or fat lamb producer aims to get a good, balanced pasture of grasses and clovers producing high yields of succulent fodder by dressings of alkaline manures such as phosphates, lime, potash, and a fertiliser of the ammonium nitrate plus calcium carbonate type, the greenkeeper must aim at a relatively low-producing sward, consisting wholly of grass species, created by dressings of dominantly acid fertilisers such as sulphate of ammonia, sulphate of iron, and sulphur, with some phosphate.

Importance of Acidity

To maintain a sports turf in optimum condition it is important to develop a degree of acidity that will result in uniformity of the sward, wholly grassy in character, possessing sufficient thrift to maintain some growth without encouraging weeds and clovers, and yet sufficiently acid to inhibit worm activity. If these conditions are created, there will be a gradual development of fibrous mat which adds resilience to the sward.

From tests made on fine-turf summer sports areas it appears that the objective on most soils should be a degree of acidity at or near pH 5.0. Some soils, particularly clays or clay loams, require greater effort to induce acidity than the sandy types of soils. Consequently, when the desired level is reached it is easier to maintain than on the lighter soils, where fluctuation in acidity levels is more rapid. In general, pH levels between 4.7 and 5.2 are satisfactory. Below pH 4.7 lack of thrift often develops, particularly on light soils, and above pH 5.2 invasion by weeds, clovers, and worms often presents problems.

Corrective measures become necessary when the level of acidity fluctuates so as to cause material variation in sward thrift, and as a general guide the following recommendations are made:—

1. Where the pH figure falls below 4.7 apply 5cwt. per acre of carbonate of lime in July-August for every fall of pH 0.1.

2. Where the pH figure lies between 4.8 and 5.6 continue to use the normal sulphate of ammonia and superphosphate mixture. This will usually achieve any correction to the higher pH level.

3. Where the pH figure rises above 5.7 apply sulphur at 1cwt. per acre in July for every pH 0.2 above that figure, with a top limit of 6cwt. per acre irrespective of the pH test.

On areas used for winter sports, where the dominant grasses are perennial ryegrass and browntop, with paspalum as well as the two former species on northern fields, very little has been done so far to create better conditions. An examination of many areas shows a high clover content and a particularly high worm population, both of which are indicative of alkaline conditions that will inevitably lead to much winter pugging. Worms, in particular, cause much damage on winter sports areas. Autumn and early winter rains drive them to the top inch or two, where their repeated casting causes the soil to lose all stability. By acidification both clovers and worms could be quickly eliminated, and, over a period of 4 to 5 years, an appreciable turf mat, capable of withstanding hard play, could be built up. For this purpose it is recommended that an initial dressing of 2cwt. to 4cwt. of sulphur, depending on pH test and soil type, should be applied in winter or early spring, and followed by 1cwt. to 2cwt. annually until the acidity had been brought to pH 5.0 to 5.2.

Fertilisers

When the corrective steps described have been taken, preferably in winter, consideration can be given to the manurial treatment.

Research work has indicated that phosphates alone are of no real value, as they encourage clover, weeds, moss, and worms. Furthermore, soil stability becomes very low in wet weather. However, phosphate has a place when used with other fertilisers.

Nitrogen is undoubtedly the most important requirement of playing areas, but care must be taken in choosing the form of nitrogen. Organic nitrogenous fertilisers such as dried blood, fish manure, blood and bone, and the non-acid forms such as nitrate of soda and fertiliser of the ammonium nitrate plus calcium carbonate type all give good growth responses, but they tend to produce coarse, succulent turf with much clover, weeds, and moss. Worms become numerous and consequently soil stability deteriorates.

Undoubtedly the best form of nitrogen to use is the acid sulphate of

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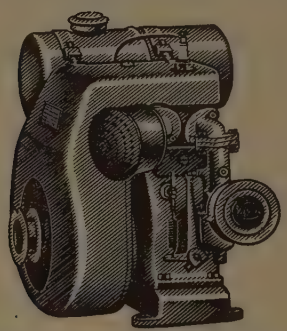

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ammonia, as it produces a uniform turf devoid of weeds, clover, and worms, and possessing resilience, stability, and the capacity for hard wear so necessary to sport.

Potash and lime are of little value as regular dressings, as they produce similar results to those obtained from phosphates alone.

Sulphate of iron was used fairly generally some years ago, but it is not now in favour. In earlier years it was used for moss control, but as this is now accomplished by sulphate of ammonia without affecting the general soil fertility as sulphate of iron does, preference is now given sulphate of ammonia.

For Summer Sports

For all summer sports areas it is now generally accepted that a mixture of sulphate of ammonia and superphosphate in the ratio of 3 to 1 provides the most satisfactory manurial treatment. This should be applied at 8cwt. per acre per annum in dressings timed to suit the particular form of sport. Thus, for purely summer games such as tennis, croquet, and bowls, applications of 1oz. per square yard of the mixture at each dressing are best made in the off-season, in April, July, and September. Occasionally this may be modified to meet seasonal conditions during winter. For example, if cold, wet conditions cause young grass to turn yellowish, an extra dressing to such parts at ½oz. per square yard would be well warranted. In general, however, no dressings should be applied while the greens are in play.

For Golf Greens

With golf greens it is usually desirable to make quarterly dressings to maintain growth throughout the year. This is achieved by reducing each dressing to ¾oz. per square yard.

Where weeds, clovers, or moss are troublesome the sulphate of ammonia-superphosphate mixture can be effective in checking and even eliminating them if it is applied dry on a dewy morning with fine sunshine following. Provided it is applied evenly, it will have little effect other than a slight temporary burning on the grass species.

For Winter Sports

On areas for winter sports some modification of manuring is required. Generally these areas will be found to be not acid enough, and, as mentioned earlier, containing much clover and worms. A test for acidity would probably disclose a figure near pH 6.0.

On such fields the initial year's treatment should be 2cwt. to 4cwt. of sulphur per acre in winter followed by 6cwt. per acre of the sulphate of ammonia and superphosphate mixture (3 : 1) applied in three dressings. The first application of the latter mixture should be made in mid-March to prepare the area for the seasonal opening; the second in mid-May to stimulate the sward before cold weather sets in; and the third in late September or early October at the end of the playing season.

In subsequent years the sulphur should be reduced to 1cwt. or 2cwt. per acre until a pH level of 5.0 to 5.2 is reached, and the rest of the manurial programme could be continued indefinitely as for the first year. From work already carried out along these lines soil stability has been increased over four times in 5 years, and evidence of an appreciable fibrous mat developing can be seen within that period.

The manurial programme on all playing areas really becomes simplified into the application of sufficient sulphate of ammonia and superphosphate (3 : 1) to encourage desirable grasses by building up acidity and so reducing clovers, weeds, and worms. Such a policy, if care is taken to avoid over acidity, should lead to much improved playing conditions for all summer and winter sports.

Triangular Gate for Cattle Yards

▲ The gate open (left) and shut (right).

THE triangular race gate illustrated is useful for cattle yards. It can contribute to efficient, quiet, and safe handling of run cattle in the race.

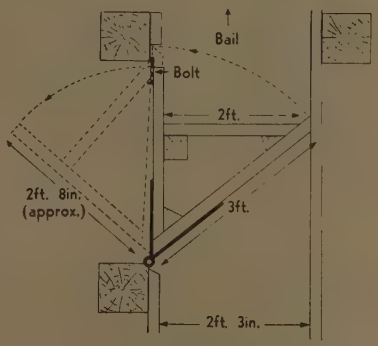
The method often used of holding cattle in a race by pushing poles or slip rails through the race behind them is risky. Accidents can occur if a beast backs suddenly before the rails are pushed into position on the other side of the race.

The triangular gate forms a side of the race when this is being filled with cattle and is easily swung across behind them to shut off the race. Even if a beast backs when the gate is partly closed, its weight will close the gate.

The boards forming the bottom half of the gate should be fairly close together, no more than 2in. apart, so that a beast cannot get a leg through and perhaps break it.

A race should be wide enough to handle all sizes of cattle and to allow any beast that goes down to be freed; and it must be narrow enough to prevent cattle turning round.

The triangular gate shown in the plan is built into a 27in.-wide race,



which is the width considered satisfactory for all-round efficiency.

The photographs were taken on Mr. C. McNab's farm at Raorikia.

—*J. G. BALL,*

Sheep and Wool Instructor,
Department of Agriculture,
Wanganui

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Yours faithfully,
(Signed) W. D. WALKER.

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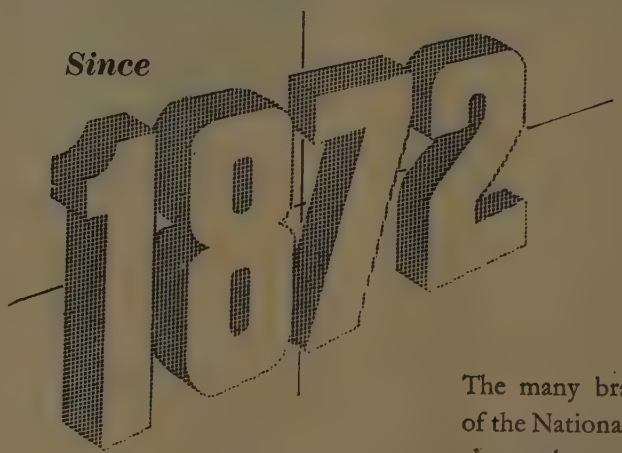

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The Management of Young Breeding Sows

THE management of young breeding sows, or gilts, has a considerable effect on the number of pigs they produce at their first farrowing. Points of management that will give good results are the subject of this article by I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington.

A Berkshire gilt.

▼ A Large White gilt.

THE wise farmer, whenever possible, replaces his breeding sows or increases his sow herd with gilts of his own breeding. By doing this he is able to select animals from strains of which he knows the performance and which have suffered no checks or illness. At this time of the year many pig producers will have young gilts that they intend to breed from next year. The way in which these gilts are managed can make a big difference to the results when they farrow. There is a general idea that a first litter will be a small one (in numbers anyway) and that nothing can be done about it. It need not be so if a few simple points in management are attended to.

Selection of Gilts

First, it is always wise, even if only one breeding sow is required, to save two or three gilts, from the selected litter, provided, of course, that they are all up to standard as far as conformation, growth-rate, feet, and teat placement are concerned. Good in-pig gilts surplus to immediate requirements can be profitably sold close to profit in May or June. Secondly, the litter from which selection is made must have been farrowed at a time that will enable the gilts to be mated at the right age and weight, that is, about 8 months old and weighing at least 250lb. liveweight, and also mated so that they will farrow at the right time of year to fit in with the feed supply on the farm. May and November are the best months for farrowing on the average home-separation dairy farm using the conventional system of weaning at 8 weeks of age.

It is advisable to pen the young gilts separately when they reach porker weight at 4½ months old and from that time to feed them less food than they would be getting if they were in the fattening pens; also they should have as much run out on good pasture as possible. It will be necessary to ring them to prevent rooting and consequent damage to pasture. The principle should be to grow them well without fattening them.

Time of Mating

When gilts saved for breeding are approaching 6 months of age a watch should be kept on them and the time when they first come on heat noted. This is important. Research work has shown that gilts mated at the first heat produced an average of 6.9 pigs; gilts mated at the second heat produced an average of 8 pigs; and gilts mated at the third to fifth heat produced an average of 9.4 pigs. This demonstrates the importance of early maturity, as gilts that have their first heat period at 6 months old can be mated at 8 months old at their third or fourth heat period with correspondingly better results. (The normal time between one heat and the next is about 21 days.)

Gilts that tend to be abnormally old, 10 months to 1 year, before they have their first heat should be discarded for breeding, as this late maturity may be inherited or they may have abnormal reproductive organs and so prove to be unprofitable producers.

Feeding Management

As stated above, when gilts are selected and penned separately they should not be fed a full fattening ration, but should be kept on a restricted diet. This requires some care, as these gilts must get sufficient food to grow well and yet must not be allowed to put on fat. A note should be made of the date when the gilts first come on heat and the most suit-

MANAGEMENT OF YOUNG SOWS

It is advisable to save more than one gilt from the selected litter.

able date worked out for mating them at the second, third, or fourth heat.

Three weeks before mating, the gilt or gilts should be put on to an increased ration of at least 5 to 6 gallons of skimmed milk, or food units, a day and fed at this level until mated. As it is usual to mate gilts in February or March, it may not be possible to feed them this quantity of skimmed milk. In that case meal should be used to make up the ration, as this increase in food during this period is of great importance. If grass is so poor in quantity or quality as to be negligible, there need be no hesitation in feeding at an even higher level—as much as the animals will readily consume—as the object is to achieve a "flushing" effect, resulting in the liberation of the maximum number of eggs at mating.

After being mated the gilt should be fed at a level which will ensure steady growth and maintenance of condition without fattening. Much will depend on the amount and quality of grass available, but the mistake of allowing the gilt to lose condition should not be made.

Research work at Wisconsin, United States of America, was carried out with three groups of young gilts. One group was fully fed right through from initial selection to farrowing; the second was fed a limited ration for the same period; the third was fed a limited ration to 3 weeks before mating, then fully fed until mated, and then returned to a limited ration.

The gilts were slaughtered at the 25th day of pregnancy and the surviving embryos were counted. The first group averaged 7.5, the second group 8.8, and the third group 9.3 embryos surviving at 25 days gestation. This shows the advantage under United States conditions of limited feeding until 3 weeks before mating, then full feeding for 3 weeks, and finally limited feeding from then on.

When these results are being interpreted it must be borne in mind that they are obtained with Poland China and Chester White pigs, which are earlier maturing types than most New Zealand pigs, and that on meal rations the full feeding would make the gilts more excessively fat than would be normal in New Zealand. The bulky nature of the dairy by-product food supply places some restriction on food intake, and the availability of animal protein in the rations is a factor favouring good breeding results from New Zealand gilts.

The degree of restriction necessary before flushing would not be so marked here as under meal-feeding conditions, and after mating the normal food supply situation will probably not favour over-feeding. The importance of avoiding loss of condition from this stage must be stressed.

Mating Practice

In the actual mating of gilts the general practice in New Zealand is to put them to run with the boar some days before they are due to come on heat. Provided no other sows are running with the boar that are likely to be on heat at the same time as the gilt, the practice is quite satisfactory. The boar should, however, be housed separately from the sows at night. Any farmers who do use controlled mating technique with their gilts should employ the standard practice of mating early in the heat, 12 hours after the beginning, and then again later at 24 to 36 hours after the beginning. Some research in South Africa indicates that though individual sows differ in their behaviour, service 12 to 24 hours from the beginning of heat was most successful in Large Whites and up to 48 hours after onset in Large Blacks.

To sum up, gilts, or maiden sows as they are more generally called in New Zealand, should be selected from a mating of proved parents, penned separately from fattening pigs at porker weight (4 to 4½ months old), and fed a limited ration that enables them to grow without getting too fat. They should be fully fed for 3 weeks before mating and mated twice at, say, 12-hour intervals at the second or third heat periods. After mating they should be fed to maintain growth and condition, but to avoid fattening, until 2 to 3 weeks before farrowing, when they should receive increased food. These methods of management will help secure good first litters and improve the productivity of breeding sows.

Meteorological Records for October

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	58.6	+ 1.8	74.0	40.0	7.89	18	+ 3.38	2.58	9	159
Auckland	160	59.5	+ 2.1	73.2	46.7	6.32	17	+ 2.23	1.20	9	189
Tauranga	10	57.4	+ 1.4	71.0	37.6	7.64	17	+ 2.67	2.97	9	178
Ruakura	131	56.2	+ 1.9	70.2	34.2	6.33	20	+ 2.20	0.97	9	181
Rotorua	975	55.1	+ 2.3	74.0	33.7	7.06	21	+ 1.90	1.01	1	146
Gisborne	12	57.6	+ 2.1	74.4	40.6	6.09	17	+ 3.66	1.67	9	178
New Plymouth ..	160	56.2	+ 1.8	68.0	40.3	5.43	20	— 0.20	0.90	29	171
Kaitoi	2125	50.8	+ 2.6	67.0	32.0	4.85	17	+ 0.60	0.83	2	
Napier	5	58.7	+ 2.2	79.2	41.0	4.92	15	+ 3.02	1.50	16	195
Wanganui	72	56.4	+ 1.6	73.2	40.2	3.52	18	+ 0.30	0.73	5	161
Palmerston North ..	110	56.2	+ 2.3	72.3	37.0	3.34	17	— 0.22	0.64	20	153
Waingawa	340	54.6	+ 1.9	71.0	32.9	3.92	21	+ 0.96	0.87	2	150
Wellington	415	55.0	+ 2.2	66.8	42.5	3.37	16	— 0.86	0.63	11	169
Nelson airfield ..	5	53.6	+ 1.4	70.0	34.5	5.28	20	+ 1.94	1.42	15	173
Blenheim	12	55.3	+ 1.6	75.6	36.4	2.99	14	+ 0.79	0.74	2	190
Hokitika	15	53.3	+ 2.3	68.1	38.7	8.72	19	— 2.30	1.68	29	180
Hanmer	1270	51.0	+ 0.4	79.0	31.0	7.53	18	+ 3.63	1.30	2	146
Christchurch ..	22	54.0	+ 0.9	77.4	36.5	2.58	12	+ 0.63	0.91	2	172
Ashburton	323	54.0	+ 1.6	79.4	33.4	4.71	13	+ 2.29	1.37	8	166
Timaru	56	54.3	+ 1.6	78.1	32.1	2.65	11	+ 0.72	0.99	4	166
Alexandra	520	54.1	+ 1.7	75.7	30.8	1.28	11	+ 0.06	0.42	3	188
Taieri	80	51.4	+ 0.3	75.8	27.1	1.03	11	— 1.03	0.26	3	169
Invercargill airfield ..	0	51.8	+ 2.8	73.3	29.1	1.71	16	— 1.77	0.31	3	184
Chatham Islands ..	140	51.7	+ 1.8	62.0	36.3	3.38	17	+ 1.45	1.02	22	

Preparation of Poultry for the Table

By H. K. MULLINS,
Poultry Instructor, Department of Agriculture, Hastings

IN the selection of poultry for cooking there are two main classes the housewife should know; namely, a young bird which is termed a roasting fowl and an older bird suitable only for boiling. Quality in table poultry is primarily a matter of feeding and care, any variation in quality being mainly caused by the feeding and preparation of the birds during the growing stage. A plump-breasted table bird of good quality naturally will have a better flavour than will a poor bird, but there are often differences in constitutional vigour even among birds of the same breed.

RHODE ISLAND Reds, Sussex, Australorps, and crosses from these breeds make excellent table birds. There is probably no finer table bird than a 16-weeks-old Rhode Island x Light Sussex capon or cockerel.

The ability to select a young bird is necessary when ready-dressed poultry is being bought, and the following points may assist the buyer.

In a young bird the bone structure is soft; thus the end of the breastbone will be found soft and pliable. In addition the shanks of a young bird are smooth and the skin supple and fine in texture.

Most household poultry keepers prefer to dress their own birds and this article describes how to kill and dress a fowl well enough for the average household table. There are many other elaborate methods of dressing table poultry.

Pre-killing Treatment

The bird should not be fed for 24 hours before it is killed, but a supply of clean drinking water should always be available. Starving the bird before it is killed permits the crop and intestines to become empty of food, thus increasing the keeping qualities of the fowl.

Killing the Bird

Most household poultry keepers still rely on the axe or the "man next door" when poultry has to be killed for the table. The use of the axe may be swift and sure, but is messy and "amateurish".

A cleaner and simpler method is to dislocate the neck of the bird. To do this hold the legs of the fowl in the left hand and place the head between the index and third fingers of the right hand, at the same time curling the tips of the fingers under the lower beak of the bird. When this has been done the head of the bird should be bent back and at the same time the neck stretched firmly until it is dislocated just below the head. A good deal of pressure is needed for an old bird, and provided the head is kept bent back, the operation is comparatively simple.

[*R. W. Orr*

The method of securing the skin covering the neck by folding the wings over.

Plucking

The plucking of a fowl is comparatively easy, success depending on having the water at the right temperature. If the water is too cold, the wing and tail feathers cannot be removed without considerable effort, and the remainder of the down and small feathers will take considerably longer than necessary to remove.

On the other hand should the water be near boiling, the skin will tear very easily and the carcass will have a half-cooked appearance. The temperature of the water should be about 180 degrees F. and the bird dipped several times until the tail or wing feathers can be removed easily. When plucking a bird remove the tail feathers first and then the wing feathers. The remainder can be removed very easily and should present no difficulty.

Drawing the Fowl

It is not the plucking but the drawing of a fowl which presents the major problem for the average housewife or household poultry keeper. The recommended method for dressing a fowl which is given below should be followed carefully.

First, cut off the head at the top of the neck with a sharp knife. Slit the skin at the **back** of the neck down to the shoulder. After this is done separate the skin from the neck and remove the neck by cutting with a sharp knife about 1in. from the base. From this end of the bird remove the crop and windpipe. After these organs have been removed insert the fingers well into the breast cavity, at the same time loosening all ligaments attached to the internal organs of the body.

At the completion of this operation reverse the bird and make an incision between the tail and vent. This incision should be just large enough to permit the insertion of the fingers for the removal of all organs, connec-

[*R. W. Orr*

There are various means of trussing a fowl and the method illustrated here of tying a piece of string to the rump or "parson's nose" and securing the legs to it is a popular one.

tive tissue, and surplus fat. If the loosening has been done efficiently, the internal organs should be quite easily removed. At this juncture the bird should be immersed in cold water for a few minutes to remove any blood.

Drawing the Sinews

The removal of the sinews is not a difficult operation, but strangely is not general practice among professional poulterers.

First, make an incision across the front of the shank about midway between the foot and the hock. Snap the bone at this incision, but do not cut it off. Twist the lower part of the shank round a few times, causing the bone to protrude through the skin. A piece of rope or wire formed into a loop and fastened to a post or wall is necessary to extract the sinews. Place the lower part of the shank and foot in the loop, grasp the leg firmly around the back and give a strong downward pull, and the sinews will come away quite easily, particularly in a young bird.

The ends of the shanks can now be cut off neatly. To save sewing the bird the legs can be pushed through the vent or alternatively a piece of string should be tied round the "parson's nose" and the legs of the bird tied securely to it. This will prevent the stuffing from falling out and will also give a much neater appearance. Finally, turn the ends of the wings back behind the shoulders, thus holding the skin of the neck in position.

Carving Roast Fowl

The carving of poultry is not usually a job which is relished by most housewives. The following is the procedure.

Place the bird on its back with the neck facing toward the left hand of the carver. Insert the carving fork through the breastbone close to the wishbone. Next, cut the skin around the thigh joint, bend back the thigh with the knife, and separate at the joint. The wings of the bird can be removed in much the same manner.

Thin slices should then be taken from either side of the breast. The string securing the legs to the "parson's nose" should be cut to make it easy to remove the stuffing.

The giblets of the birds, consisting of gizzard,, liver, heart, and neck make excellent soup or gravy and should not be discarded.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during January as follows:—

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

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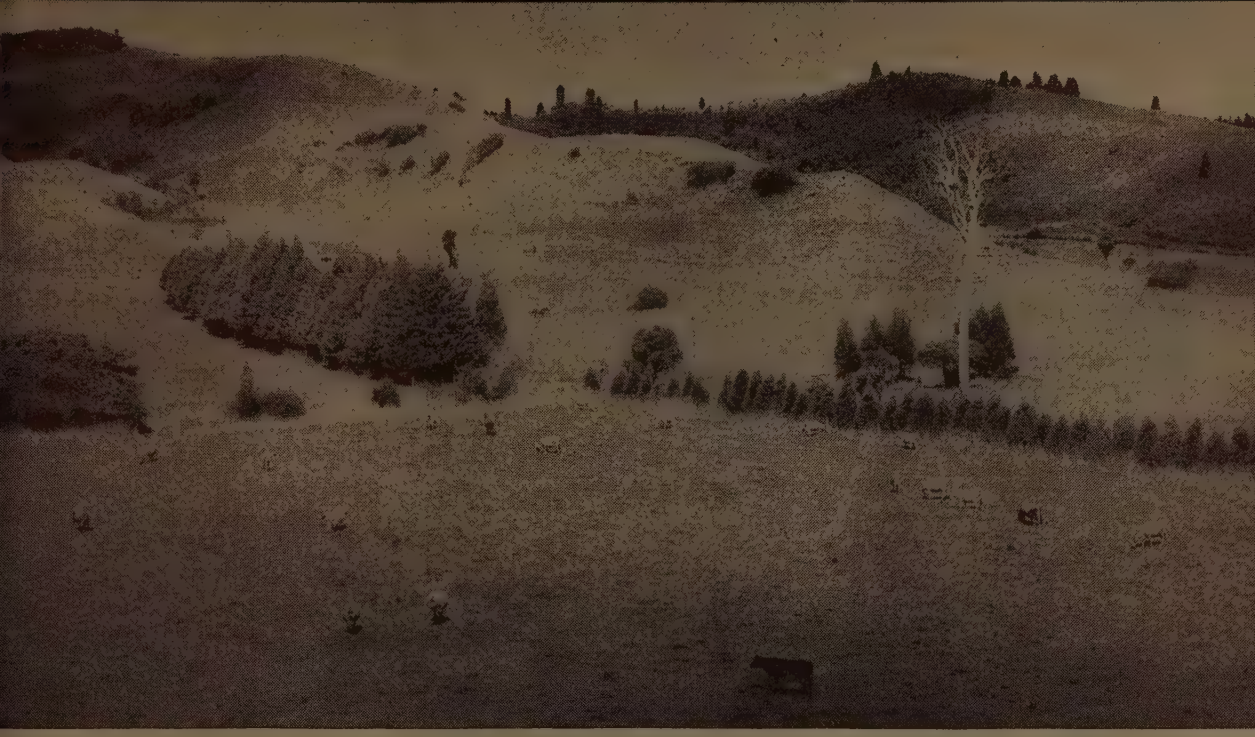
4YA Dunedin, Tuesdays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.



Topdressing in Eastern Bay of Plenty

TOPDRESSING is an important pasture management practice in eastern Bay of Plenty. Several soils require potash as well as phosphates, and on some soils the improvement effected by superphosphate applications has been due in part to the sulphur supplied in superphosphate as calcium sulphate. This article by S. R. Hewitt, Instructor in Agriculture, Department of Agriculture, Whakatane, describes the soils and topdressing practices in Opotiki and Whakatane Counties and discusses the results of topdressing trials in relation to information supplied by the Department's advisory soil testing service.

THE eastern Bay of Plenty comprises the whole of Opotiki County and Whakatane County with the exception of Galatea and Murupara districts. The main agricultural area is the Rangitaiki Plains, which are approximately 8 to 12 miles deep and run some 12 miles along the coast west of Whakatane, and the rolling and hilly country which bounds the plains to the west and separates them in the east from the small area of alluvial flats at Opotiki. From Opotiki to Cape Runaway is a narrow strip of rolling to hilly country which is backed by the steep Raukumara Range. Farming is confined mainly to the flat plains, valleys, and adjacent rolling country.

Climate

On the Rangitaiki Plains the annual rainfall is about 50in. The fall increases on the western hilly areas and on the southern high country the annual fall is about 60in. to 80in.; on the very steep country in from the coast and leading up toward Cape Runaway it exceeds 80in.

On the farmed country, therefore, the rainfall ranges from 50in. to about 70in. per annum. The monthly distribution of rainfall is normally satisfactory. The greatest falls are recorded during winter and early spring. Frosts can be severe on the Rangitaiki Plains in from the coast and along the valleys leading to Opotiki, but they are confined to winter.

Land Use

Farming naturally follows topography in the district, and the flat lands of the Rangitaiki Plains, with the fertile valleys of Opouriao and Waimana through Waiotahi to the Opotiki flats are almost entirely devoted to dairying. Dairy farming is also carried out on the rolling country and low hills which fringe the valleys and plains between the coast and the higher hill country. Some of this potential dairying country is used for fat lamb raising and a small proportion of the steeper and poorer country developed from forest and scrub is used for the grazing of sheep and cattle. On the higher country in from Matata and including Manawahe mixed dairying and sheep farming is carried out.

A few years ago in the Opotiki and Whakatane districts a large acreage was planted in maize for grain, but today small areas are grown and only as an adjunct to dairy farming. A considerable portion of the moderately hilly Tarawera ash country south of Te Teko has been planted in exotic pine forests.

Pastures

Paspalum is the dominant pasture plant throughout the eastern Bay of Plenty on the swamps and flats and on the rolling to moderately hilly country. Where topdressing is regular white clover is the most common clover present, and on lightly topdressed or untopdressed areas *Lotus uliginosus* (*major*), suckling clover, and other annual clovers are the dominant legumes.

HEADING PHOTOGRAPH: A typical dairy farm on Whakatane ash soils at Wainui, near Whakatane.

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Grasses associated with paspalum are varied, ranging from browntop, danthonia, and sweet vernal at the lower end of the fertility scale to ryegrass at the other end. With the exception of the pastures on the rich alluvial soils, ryegrass cannot compete with these other lower-producing grasses.

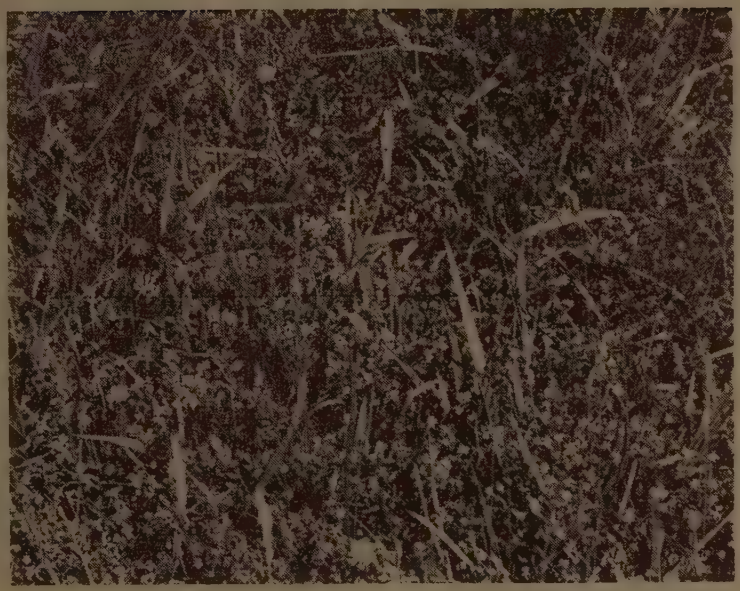
The main factors contributing to the poor establishment of ryegrass in swards are, first, low fertility and secondly, insufficient moisture in summer. Occasionally on a moist, fertile soil paspalum has been allowed to grow rank in summer and thus overshade and eliminate the ryegrass and white clover. As the area of moist, fertile soils is limited to the alluvial soils alongside the rivers and banks of old riverbeds, there are large areas of pastures on the Rangitaiki Plains which are dominantly paspalum and which produce very little growth from June to October and a very large amount from November until May, when paspalum is at its best.

The introduction of short-rotation ryegrass, resowing, oversowing, the use of potash, and an appreciation of soil types in relation to the demands of the individual pasture species are factors all helping to level out this uneven growth curve.

Topdressing

Opotiki County contains 112,000 acres of sown grass and Whakatane County 176,000 acres. Of this sown grassland 31 per cent. in Opotiki County was topdressed in 1952 and 68 per cent. in Whakatane County (see Table 1). A fair proportion of the sown grassland in both counties is on very steep country and will be topdressed only as aerial topdressing develops more in the area.

TOPDRESSING IN BAY OF PLENTY



Vigorous and healthy pasture growth in a trial at Whakatane after treatment with double superphosphate, potash, and gypsum. The results are similar to those from superphosphate, which is over 50 per cent. gypsum, and potash. Double superphosphate and potash without the addition of the sulphur-bearing gypsum gave a comparatively poor response in the form of lack of vigour in the sward, pale colour, and an absence of white clover.

▼ Looking west across the Rangitaiki Plains from above Whakatane township. The hills in the background extend from Matata in the north to Rotoma in the south.

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TABLE I—AREAS TOPDRESSED AS PERCENTAGES OF TOTAL SOWN GRASS ACREAGES

Year	Opotiki per cent.	Whakatane per cent.
1931	12	50
1941	25	63
1948	28	59
1950	31	67
1952	31	68

During the period covered in Table 1 the areas topdressed rose from 17,000 acres to 35,000 acres in Opotiki County and from 58,000 to 120,000 acres in Whakatane County.

For many years regular topdressing of pastures with phosphate fertilisers has been customary in the established dairy farming and fat lamb raising districts. Superphosphate or serpentine superphosphate is the phosphatic fertiliser mostly used today, and to a small extent basic slag is also applied, but the tendency is to use less of this type of manure. Rate of application is about 2cwt. to 3cwt. per acre and this amount is generally applied each year. Today time of application is largely influenced by the rather irregular delivery of superphosphate, though the aim is to apply the fertiliser in autumn and early spring. There is a growing practice on the more established dairy farms to split the annual application and to apply two light dressings during the year. This is probably partly because more and more potash is being used each year throughout the districts and this fertiliser is generally applied in spring.

The pasture sward in this trial at Whakatane lacks vigour, is an unhealthy colour, and generally has no white clover. The manurial treatment was double superphosphate and potash, but no gypsum.

A marked response to superphosphate at 1½cwt. per acre in a trial at Whakatane. The area on the left received muriate of potash only and that on the right with the vigorous clover growth received muriate of potash and superphosphate.

Rates of application of muriate of potash tend to be rather conservative, about ½cwt. to 1cwt. per acre. This is regarded as a maintenance dressing, and where soil potash levels are low heavier dressings are needed for the initial applications. Some farmers are applying potash on rolling to hilly country from the air, irrespective of whether the soil is known to be deficient. With the exception of sulphur, which is a normal constituent of superphosphate, it is not the rule to apply any of the usual trace elements for pasture growth. Both cobalt and copper are applied for animal health and there is an increasing demand for copperised superphosphate.

Liming is not a regular practice on the average farm and it is uncommon for rates to exceed 10cwt. per acre when the lime is applied in bulk form, which is the usual method of application today. The demand for lime is spasmodic throughout the districts and there are many farms that have never been dressed with it, though some have had it applied occasionally.

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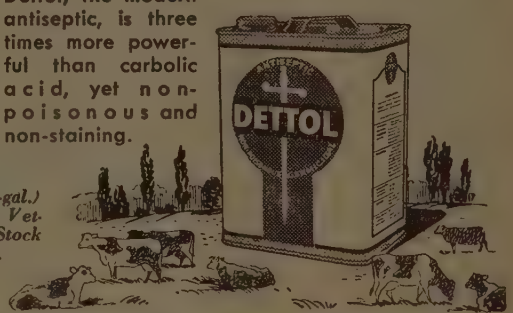

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Soils

Whakatane and Opotiki Counties have been covered by a number of volcanic ash showers (Whakatane, Kaharoa, and Tarawera showers) which have given weakly weathered soils. The Tarawera shower resulted from the eruption of Mt. Tarawera in 1886 and the ash was deposited over the country to the north-east of the mountain. This ash, which covers a large part of the Rangitaiki Plains, fades out toward Whakatane, covers the hills of Rotoma and Manawahe, and extends south toward Galatea. The bulk of this ash consists of small particles of black, scoria-like material the size of fine gravel which has not yet weathered. It is basalt, and is therefore likely to form a fertile soil in years to come. At present it is droughty and of moderate or rather low fertility.

The Kaharoa shower is a pumice soil. It extends east to the Whakatane River, appearing in the neighbourhood of Galatea and Te Whaiti, and covers the country in a north-west direction toward Tauranga. It is dark grey and rather coarse and sandy.

The oldest of this group of ash showers is the Whakatane shower. From Whakatane to Opotiki and east as far as Te Kaha along the coast all but the steep slopes are covered in this ash. It is brownish, tending to become much darker as the organic matter content increases, is of medium texture, and forms a soil of high potential fertility. The subsoil is a yellow-brown loam which is friable and has a fairly high clay content. This volcanic shower is a mixture of andesitic and rhyolitic parent material.

On some of the steep and very steep slopes of the whole region rain has tended to wash away the deposited ash and thus has exposed the underlying original hill soils. These are generally derived from greywacke and are coarse sandy silts known broadly as skeletal soils. They are of low to moderate natural fertility. This Whakatane ash also occurs on the flats and in the valleys as alluvium and the soils thus formed generally have a low clay content and are free draining and easily worked.

TOPDRESSING IN BAY OF PLENTY

Lucerne under drought conditions on Tarawera ash, Kawerau. This is a 5-year-old stand which has been cut 3 weeks.

A typical soil profile under permanent pasture in the Otakiri district on the Rangitaiki Plains. The top 8in. is Tarawera ash mixed with built-up organic matter on about 14in. of fine pumice which in turn overlies about 6in. of coarse sandy gravelly pumice, and the whole is supported on a layer of peat of variable depth.

Soil Types

For convenience the soils of the eastern Bay of Plenty have been grouped into four main classes:—

1. Flat country soils:—

(a) Rangitaiki Plains: Silt loams from river alluvium; coastal sands;

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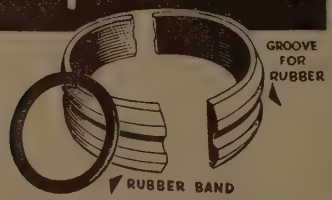

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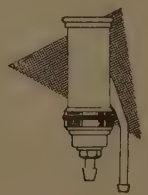

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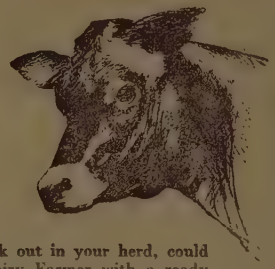

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A natural soil profile at Wainui, near Whakatane. There are 6in. to 7in. of brown gravelly sandy loam and 10in. to 14in. of light yellow sandy loam on yellow coarse sandy loam.

coarse wind- and water-sorted ash soils; coarse dark-grey Kaharoa ash soils; gravelly Tarawera black ash soils; peaty loams.

(b) Opotiki Flats: Deep and shallow silt loams.

2. Rolling to hilly country soils: Whakatane dark brown ash soils; Tarawera black ash soils.

3. Hill soils: Whakatane ash on the eastern hills; Tarawera ash on the mid-eastern hills; Kaharoa ash on the mid-eastern hills.

4. Steep and very steep hill soils: Skeletal soils.

Fertiliser Trials

From 1951 to 1954 a number of observational fertiliser trials were laid down on various soil types in the eastern Bay of Plenty. The aim of these experiments was to secure information on pasture responses on different soils to topdressing materials either alone or in combination. Superphosphate or serpentine superphosphate, muriate of potash, and lime were used in almost all the trials, and a number included basic slag, North African phosphate, Nauru rock phosphate, and common salt. Also 14 molybdenum trials using sodium molybdate were laid down on the main soil types, and six trials with sulphur in the form of calcium sulphate (gypsum) were put down, mainly on Tarawera gravel soils.

The phosphates were applied at 3cwt. per acre and sometimes at 6cwt., and the potash was sown at either 1cwt. or 1½cwt., with repeat applications of each manure every year during the life of the trial. Lime was used at from 3cwt. to 1 ton per acre, depending on the soil type and thereafter annually at 3cwt. in most trials. Sodium molybdate was generally applied either at 2oz. or 2½oz. per acre and calcium sulphate was used at 100lb. per acre on most trials with some at 150lb. or 200lb.

Soil Tests

Soil samples were taken before the trials were laid down and the samples were tested for phosphate, potash, pH, and calcium. Potash was the most deficient element and generally the levels were low, but there were some medium and some high tests. Phosphate was less deficient and results varied from a few low tests to equal numbers of medium, satisfactory, and high levels. The samples were only moderately acid, fluctuating about a pH of 6.0 and ranging from a pH of 5.5 to 6.4 The test levels for available molybdenum varied somewhat in magnitude, but they were not considered to be low. In the pH scale the higher the figure is the less acid it is until a pH of 7.0 is reached, when the reaction is neutral; above this the figure indicates alkalinity.

Trial Results

The trials are now advanced enough to summarise the results which were determined by observing improvements in the pasture. Each trial is carried on for at least 2 years and many for 3 years or more. Observations were made at intervals and responses are indicated by a system of points ranging from 0 to 5, 0 indicating no visible difference from "no manure" and 5 indicating an excellent difference.

A Tarawera ash soil profile in its natural state near Kawerau, showing 12in. of black gravel on 3in. of fine pumiceous sand on pumiceous gravelly sand.

Response in these observational topdressing trials was seen in several ways:—

1. Increase in clover content of sward.

2. Increase in proportion of better grasses to poor grasses and suppression of weeds.

3. Improvements in density, colour, and vigour of sward.

4. Evidence of grazing preference by stock.

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The results of the topdressing trials are summarised in Tables 2, 3, 4, and 5; these results and those of the soil tests have been grouped according to soil type.

Table 2 deals with the soils derived from Kaharoa and Tarawera ash. In nearly all trials pastures did not respond very well to phosphates on plots which had not received potassic fertilisers. Unfortunately too few of the experiments had a potash-alone treatment; for this reason it is impossible to estimate how well the soil test for phosphate agrees with trial results. It is obvious, however, that the soil test for potash has reliably indicated deficiencies of this element.

No pasture responses occurred to molybdenum; none was expected. Lime responses are uncommon on mineral soils derived from pumice ash, but could occur on peaty soils. In fact a clear pasture response to lime in Experiment No. 1694 at pH 5.6 suggests that the peaty loams intermixed with Tarawera ash should be farmed at slightly less acid conditions, say pH 6.0.

Since in a field experiment on Tarawera ash soil good responses were obtained from superphosphate (which contains sulphur) and no responses were obtained from basic slag (which contains no sulphur), it was suspected that pastures on this soil may respond to sulphur.

Accordingly a trial to study sulphur was laid down. Gypsum was used as the source of sulphur and double superphosphate (which contains no sulphur) as the source of phosphorus. The belief that sulphur is important for pasture vigour was confirmed.

TOPDRESSING IN BAY OF PLENTY

Muriate of potash at 1½cwt. per acre resulted in a vigorous white clover response in this trial at Otakiri. The part at left received superphosphate only and the stunted growth consists mostly of paspalum with weed grasses and annual clovers. The part at right was treated with superphosphate and potash.

TABLE 2—TOPDRESSING RESPONSES ON KAHAROA AND TARAWERA ASH SOILS

Treatments	Responses*											
	Kaharoa ash soils						Tarawera ash soils					
	On peaty loam		Sandy silt on peat	Well drained		Black sand	On peaty loam				On gravelly sand	
	Experiment No. 1998	Experiment No. 2145	Experiment No. 1765	Experiment No. 2162	Experiment No. 2171	Experiment No. 2150	Experiment No. 2011	Experiment No. 1694	Experiment No. 2163	Experiment No. 2164	Experiment No. 1791	Experiment No. 1802
Superphosphate		½	2		0	2		1½	½		1½	2
Serpentine superphosphate	3						0				1	2
Basic slag					?			¾	0			0
North African phosphate								1			0	
Fine Nauru												
Basic slag + potash					3			2½	4			½
Serpentine superphosphate + potash	4½						2½				3	3½
Superphosphate + potash		2½	2½	3	3	3½		3	4	4	3	3½
Phosphate + salt		1½					1½					
Phosphate + salt + potash		3					3					
Potash alone	0		0					1½				
Lime	½	0	½	0		?	0	1		?	0	0
Lime + phosphate + potash	4½	2½	3	3			2½	4		4	3	3½
Lime + phosphate + potash + molybdenum				3		3½				4		
Lime + phosphate + molybdenum												
Lime + phosphate												
Soil analysis												
Phosphate	Low	Low	Very low	High	High	Medium	Medium	Medium	Medium	Medium	High	Medium
Potash	Medium	Low	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Low
pH	6.1	6.4	6.1	6.3	6.1	6.5	5.9	5.6	6.0	6.0	6.2	6.2
Molybdenum				High		Low to medium				High		

* 0—no response; ?—doubtful; 1—slight; 2—fair; 3—good; 4—very good; 5—excellent

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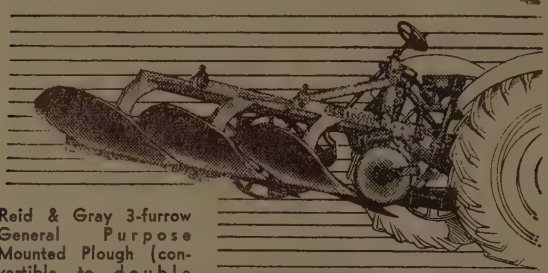

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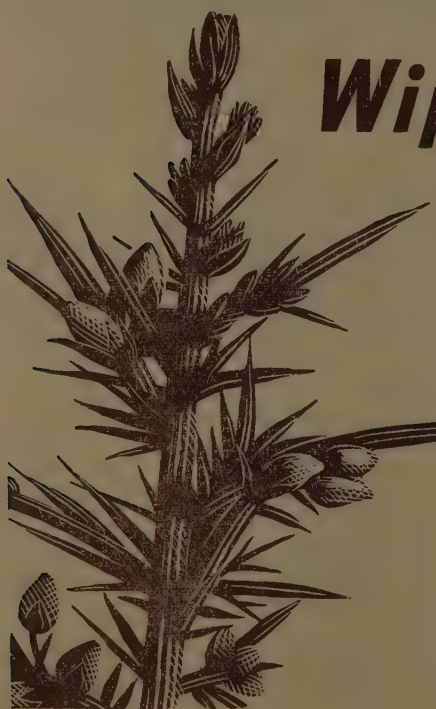

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TABLE 3—RESPONSES TO PASTURE TOPDRESSING WITH CALCIUM SULPHATE ON TWO SOILS ON RANGITAIKI PLAINS

Experiment No.	Soil	Phosphate test	Responses*	
			Double superphosphate and potash	Double superphosphate, potash, and gypsum
2167	Tarawera ash ..	High ..	1	3
2331	Tarawera ash ..	Medium ..	1	3½
2320	Tarawera ash ..	Very high ..	1	1
†2329	Tarawera ash ..	High ..	2	2
2321	Alluvial silt loam	Medium ..	1½	4

* 0—no response; ?—doubtful; 1—slight; 2—fair; 3—good; 4—very good; 5—excellent.
† Lucerne.

Double superphosphate alone resulted in weak, pale clover growth, and double superphosphate and gypsum resulted in vigorous clover growth. A further four trials were put down on this soil type and also one on an alluvial silt deposit soil. Two of the trials were on lucerne, but the gypsum did not give obvious results and this is probably because superphosphate, which is about half gypsum by weight, had been regularly applied previously by the farmers on whose farms the trials were laid down.

On the three trials (Table 3) where a good response to gypsum was obtained superphosphate was applied over the past few years at a rather light rate.

Superphosphate is only economical for correcting sulphur deficiency when at the same time it is meeting a deficiency of phosphorus. Such a deficiency will exist in the early stages of topdressing such soils as Tarawera ash and for a longer period on pumice soils. The use of gypsum is likely to become important in future because of the ready build-up of phosphorus in many soils compared to the high leaching rate of sulphur.

Herbage samples from the manurial treatments were analysed for sulphur and, with the exception of the samples from an alluvial silt loam soil, those from the gypsum plots have increased in sulphur content. The sulphur level of the herbage from the control plots in two trials is low and this is consistent with the gypsum responses. Further sulphur trials are required on other soil types in the Bay of Plenty before the extent of sulphur deficient areas can be defined.

Table 4 gives the results of topdressing responses on soils of the Rangitaiki Plains. There is a wide variation in phosphate and potash test. Results show quite good agreement with the potash test and also with the phosphate test provided a lack of potassium is not limiting growth. The slight lime responses on soils derived from recent alluvia and on peaty loam soils suggest that these soils should be farmed at about pH 6.0.

TABLE 4—TOPDRESSING RESPONSES ON SOILS OF RANGITAIKI PLAINS

Treatments	Responses*								
	Recent silt loams from alluvium					Peaty loams		Coastal sands	
	Deep		Shallow		Sandy	Deep	Gravelly	Black sands	
	Experiment No.		Experiment No.		Experiment No.	Experiment No.	Experiment No.	Experiment No.	
	2177	1821	2176	1822	1794	1710	1800	2149	2147
Superphosphate	1	0	1½	3½	0	1	½	0	1
Serpentine superphosphate					0		½		
Basic slag					0				
North African phosphate					0		0		
Fine Nauru		0			0				
Basic slag + potash					0				
Serpentine superphosphate + potash					0		1		
Superphosphate + potash				4	0	2½	1	3	2
Phosphate + salt									
Phosphate + salt + potash									
Potash alone				0	0	½			
Lime	½	0	½	0	0	½	0	0	
Lime + phosphate + potash				4	0	3	1	3	
Lime + phosphate + potash + molybdenum								3	
Lime + phosphate + molybdenum	1½		2						
Lime + phosphate	1½		2			1½			
Soil analysis									
Phosphate	Med.	Very high	Low	Low	High	Low	Med.	High	Low
Potash	Med.-high	Med.	High	High	High	Very low	Low	Low	Low
pH	5.9	6.1	5.5	5.8	5.9	5.4	5.9	6.4	6.2
Molybdenum	High		High					Low	Low-med.

* 0—no response; ?—doubtful; 1—slight; 2—fair; 3—good; 4—very good; 5—excellent.

Table 5 gives the results from topdressing trials on rolling and hilly country. Soils generally show a response to potash and superphosphate or serpentine superphosphate.

Soil Test and Topdressing Results

With a few exceptions the relation between soil test and trial results seems a fairly consistent one within the main soil groups.

The phosphate test needs further evaluation by experiments because frequently in past work neither potash nor sulphur was eliminated in the experimental design as a possible complicating factor.

In practice, however, soil test results are a valuable aid in advisory work because they supplement other information such as the past topdressing history of a field, its appearance, and its management.

Topdressing Recommendations

The results of the topdressing trials have been summarised according to soil type and it is now possible to recommend the quantities and types of topdressing materials for these soils. Since superphosphate or serpentine superphosphate, irrespective of soil type, has proved superior to other forms of phosphate, the picture is not a complex one. Though there is no material difference in the responses from these two manures, it is recommended that superphosphate because of its higher phosphate and sulphur content (which cannot be ignored) should be used.

In the pasture sward vigour of clover growth is a reliable criterion of the level of plant nutrients in the soil. Compared to the grasses clovers are shallow rooting and are thus the first species to suffer from a deficiency and conversely are the most rapid in responding. In this respect potash has been spectacular and the greatest responses have been obtained from applications of superphosphate plus potash. In observing responses in trials the trained eye can probably note a 15 per cent. or less response, and even when a slight response is obtained it is regarded as a payable one.

On recent alluvial silt loams and certain terrace alluvia which have a higher natural fertility rates can be lower than elsewhere. A maintenance dressing at 1½cwt. to 2cwt. of superphosphate is generally adequate. Some farms have not received any manure, yet do not appear to have suffered any deleterious effects.

Potash where required should be applied at 1cwt. to 1½cwt. per acre

TOPDRESSING IN BAY OF PLENTY

A 9-month-old stand of cowgrass sown down on raw Tarawera gravel at Onepu. The whole stand received superphosphate at sowing down, but only the part at right received a further dressing about 7 months later. The response is probably due to the gypsum, as this soil type has shown excellent responses to gypsum applications.

for the first application, followed by an annual rate of 1cwt. for a few years. After this generally a maintenance dressing of ½cwt. is sufficient. It appears that potash deficiency has been induced in these soils by regularly cutting the same areas each year for silage and hay, by cropping, and by the practice of using day paddocks for the milking herd.

On the "swamp soils" of the Rangitaiki Plains and other farmed areas generally superphosphate rates should be heavier, 2cwt. to 3cwt. per acre, though if the past history has been one of heavy rates, these can be reduced to 2cwt. for a period.

When soils are being grassed down for the first time after scrub, as on the rolling and hilly country, at least 6cwt. per acre is needed within the first year, but following rates need then to be only 2cwt. to 3cwt. Soils on this type of country in their unfarmed state are naturally fairly high in available potash but low or very low in available phosphate. An example is Whakatane gravelly sandy loam (derived from Whakatane ash) and also Ohinepanea sand (Kaharoa ash). After some years of farming on the easier rolling country potash deficiency seems to spread; this is similar to what happens on the silt loams.

Today, on the bulk of the soils of the plains, such as the Awakeri and Otakiri soils, Tarawera ash, peaty loams, and coastal sands, potash deficiency is widespread and in many cases whole farms need muriate of potash applications. Rates of 1½cwt. an acre or more are needed to begin with and after this a regular rate of 1cwt. per acre each year is generally needed. How long this should be maintained is determined by the results obtained. On these soils common salt, which can be bought fairly cheaply in New Zealand, can replace some of the potash used, but potash should not be omitted from the topdressing programme. A satisfactory mixture would be 1cwt. of each material. Salt in some soils appears to release potash from the soil complex and make it available to plants.

On the heavier soils and on peaty soils some lime is needed. Because most lime is now applied in bulk form, it is best to apply it at 10cwt. per acre every 4 to 5 years. Overliming can do harm by making certain trace elements unavailable.

On the lighter soils derived from volcanic ash it is doubtful whether lime is ever of any benefit.

Time of application of quick-acting manures such as superphosphate and potash is generally related to the urgency of need for fresh growth. Superphosphate can be applied in autumn on those pastures to be closed for winter-saved feed, and some can be applied in spring either on the same areas or else on pastures that are to be closed for silage and hay and including those not treated earlier.

Initially potash gives the best results when applied in the early spring, though repeat dressings can go on some areas in early autumn. Late autumn and winter applications should be avoided, as there is little growth then and much of the potash will either be lost or made unavailable by the following spring.

TABLE 5—RESPONSES TO TOPDRESSING ON ROLLING AND HILLY COUNTRY

Treatments	Responses*									
	Soils of easy rolling to hilly country					Soils of the hills				
	Loamy Whakatane ash			Kaharoa ash on Whakatane ash		Kaharoa ash			Tarawera ash	
	Sandy loam on yellow loam			Gravelly sand on sandy loam		On white pumice sand			On coarse Kaharoa ash	
	Experiment No.			Experiment No.		Experiment No.			Experiment No.	
	1790	1789	2012	2155	2148	1792	2178	1711	2179	1793
Superphosphate	½	2		1½	1	½		2		
Serpentine superphosphate	1	1½	½			0	½		2	1
Basic slag	0		0							½
North African phosphate		1				0				½
Superphosphate + potash		2		2	2	1		2		
Serpentine superphosphate + potash	2		3				2½		2½	1½
Potash alone								½		
Lime	0	0	?	?	?	0	0	0	0	
Lime + phosphate + potash	2	2	3	2	2		2½	2	2½	
Lime + phosphate + potash + molybdenum				2	2		2½		2½	
Lime + phosphate + molybdenum										
Lime + phosphate	½			1½		0	½	2	2	
Soil analysis										
Phosphate	High	High	Med.	Med.	Low	Med.	High	Low	High	High
Potash	High	High	Med.	Med.-high	Med.	Low	Low	High	Med.	Low
pH	6.1	5.9	5.5	6.1	6.1	5.9	5.9	6.0	6.3	5.7
Molybdenum				High	High		Med.-high		Med.-high	

* 0—no response; ?—doubtful; 1—slight; 2—fair; 3—good; 4—very good; 5—excellent

Brassica Seed Production

Treatment of crops when they are not in the flowering stage avoids harm to bees.

THE area of brassica crops grown for seed production has declined considerably in recent years. The general decline in cash cropping, with uncertain yields from brassica crops due to the increase of disease and pests, has probably been responsible. Availability of seed of these crops at a reasonable price is essential to the planned provision of supplementary feed. The shortage of chou moellier and kale seed for the 1955 sowing season is an example of what can happen when local production is low and seed is not available from overseas. In this article C. P. Whatman, Instructor in Agriculture, Department of Agriculture, Ashburton, discusses chou moellier, kale, and rape seed production with special reference to the control of aphids.

A CHECK in growth, generally due to a short period of drought, followed by warm, moist weather is favourable to the rapid spread of aphids, or "blight" as they are commonly called. Severe infestation at flowering and during the early green-pod stage can turn a promising crop into a complete failure. In the past these pests were beyond the control of the grower, but with the development of the newer insecticides some control is now possible. At the same time indiscriminate use of these materials is so dangerous that it is thought desirable to give some advice on their use.

CHOU MOELLIER AND KALE

Crops harvested for chou moellier and kale seed are generally grown specially from Certified Mother seed of Giant or Medium-stemmed chou moellier and thousand-headed kale. Sowing should be done on land in good heart fallowed out of grass since the previous winter and cultivated until December to kill weeds and conserve moisture. Good drainage is essential. The seed should be sown before Christmas, as later sowing increases the proportion of plants which fail to flower the following year. Seeding rates should be from 4lb. to 5lb. per acre.

Excellent seed yields are frequently obtained from areas sown for winter feed and not required for that purpose. These crops are, however, uncertified and the price received for the seed is dependent on supply and demand in that season. Crops which have been grazed even lightly during winter and then allowed to recover and flower are rarely satisfactory seed producers.

A chou moellier seed crop in full flower.

Aphid Control

The poison used for aphid control, lindane, is non-selective. It is lethal to bees, which carry the insecticide back to the hives and poison the brood. Bumble bees, night-flying moths, and other pollinating insects working the crop or other plants flowering in it are also killed. Hence it is vitally important that spraying be done at a time when these insects are not visiting the crop.

Autumn Application of Insecticide Recommended

Aphid infestation usually starts in autumn. Spraying at this time reduces or may even eliminate the overwintering population, thus making a spring infestation less likely.

Crops may be sprayed during autumn with ¼lb. of lindane per acre. In bad cases a further treatment at the same rate 3 weeks later is advis-

BRASSICA SEED . . .

able. Average crops require 12 gallons of water per acre and for very dense, leafy crops 15 to 20 gallons is necessary.

During winter treatment is not satisfactory. The aphids are well sheltered by the leaves of the plants and it is not until early spring that the emergence of the flower stalks exposes the aphid colonies. There is a very short period in spring when spraying is both effective and safe. It must be completed before the first yellow colour shows through the calyx of the earliest flowers. It is dangerous to depend on spraying or dusting at this period, as weather conditions or other factors may prevent the job being done in time.

Harvesting

Chou moellier is direct headed. It does not shell readily and can be left until it is fairly ripe. Sacks are partly filled with seed and hung on the fence for several weeks until the seed is mature. Heading of these crops, which may be up to 8ft. high, is not easy, but it is remarkable how well a header will handle them. In exceptional cases they have been headed with a header carried on a truck to give sufficient height. Kale may be harvested in the same way or may be treated as is the rape crop.

Yields have been extremely variable, from nil to over 10cwt. per acre, but on good land they should be from 4cwt. to 5cwt. per acre. The return per acre is good, but it should be remembered that the seed is not harvested until about 18 months after cultivation for the crop is started, and returns must compensate for this fact.

RAPE

As with chou moellier and kale, rape is best grown on land fallowed out of lea. Most soils are suitable, except those which are poorly drained. Seed is best sown in March at 5lb. per acre. Later sowing does not allow plants to become firmly established before winter and frost lift may cause considerable loss. Certified Mother seed of any of three varieties—Broad Leaf Essex, Giant, or Club-root Resistant—may be grown.

Second growth from a fed-off fattening crop rarely produces a good seed crop. It is extremely subject to aphid attack and strong winds break off many of the flowering branches.

Aphid Control

Control of aphids in a rape crop is extremely difficult. Infestation does not usually occur in autumn. Because of the risk to pollinating insects treatment must be given in spring before the first colour shows through the calyx of the earliest flowers.

Harvesting

Rape shells so freely that direct heading is not practicable. The usual method is windrowing with a binder when the seed is turning brown and picking up with a header. Various adaptations both of the binder and of the header can be made to reduce the loss of seed in harvesting. Alternatively, the crop may be cut and tied with the binder and either stooked or the sheaves allowed to lie on the stubble until picked up for threshing.

Yields of over a ton per acre have been recorded, but these are exceptional; a good crop will yield from 8cwt. to 10cwt. per acre.

PRECAUTIONS WITH LINDANE

Wherever lindane is used it is harmful to all insects. Honey bees, bumble bees, moths, butterflies, and other insects play their part in the essential process of pollination. The utmost care must be taken to ensure that no spray or dust reaches flowers of any kind visited by insects, even if these flowers are on weeds, gorse fences, or in neighbouring paddocks. Drift on to bee hives must also be avoided. A healthy insect population is necessary for seed setting of brassica crops, and, more important still, clover crops. In addition, bees are the apiarist's livelihood.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April.

NORTH ISLAND

January

1 January—Nuhaka A. and P. at Nuhaka.
11 and 12 January—Wairoa County A. and P. at Wairoa.
18 and 19 January—Feilding I., A., and P. at Feilding.
*19 January—Kaeo A. and P. at Kaeo.
19 January—Central Hawke's Bay A. and P. at Waipukurau.
22 and 23 January—Rotorua A. and P. at Rotorua.
*25 and 26 January—Horowhenua A. and P. at Levin.
26 January—North Kaipara A. and P. at Paparoa.
30 January—Marton A. and P. at Marton.

February

1 and 2 February—Rodney A. and P. at Warkworth.
2 February—Woodville A. and P. at Woodville.
*2 February—Rangitikei A. and P. at Taihape.
*5 and 6 February—Dannevirke District A. and P. at Dannevirke.
7 February—Te Kauwhata A. and P. at Te Kauwhata.
8 February—Dannevirke District Annual Ram Fair at Dannevirke.
8 and 9 February—Taumarunui and District A. and P. at Taumarunui.
8 and 9 February—Taranaki A. and P. at New Plymouth.
9 February—Waitemata A. and P. at Waiwera.
9 February—Pahiatua A. and P. at Pahiatua.
9 February—Hukerenui A. and P. at Hukerenui.
13 February—Te Awamutu A., P., and H. at Te Awamutu.
15 and 16 February—Ohura A., P., H., and I. at Nihoniho.
*15 and 16 February—Masterton A. and P. at Masterton.
16 February—Tauranga A. and P. at Tauranga.
16 February—Northern Wairoa A. and P. at Arapohue.
16 February—Waiapu P. and I. at Ruatoria.
16 and 17 February—Franklin A. and P. at Pukekohe.
19 February—Otorohanga A. and P. at Otorohanga.
21 February—Matamata A. and P. at Matamata.
22 and 23 February—Te Kuiti and District A. and P. at Te Kuiti.
22 and 23 February—Wellington and Hutt Valley A. and P. at Trentham.
23 February—Putaruru District A. and P. at Putaruru.
*23 February—Te Puke A. and P. at Te Puke (50th Jubilee).

March

2 March—Albany A. and P. at Albany.
2 March—Mangonui County A. and P. at Kaitaia.
2 March—Waiotira Junction A. and P. at Waiotira.
2 March—Waikato Central A. and P. at Cambridge.
2 March—Whakatane A. and P. at Whakatane.
6 March—Morrinsville A. and P. at Morrinsville.
*9 March—Opotiki A. and P. at Opotiki.
9 March—Kumeu District A. and P. at Kumeu.
15 March—Wellsford A. and P. at Wellsford.
16 March—Hawke's Bay A. and P. at Hastings.

SOUTH ISLAND

January

12 January—Blueskin A. and P. at Waitati.
19 January—Waikouaiti A. and P. at Waikouaiti.
19 January—Peninsula H. and P. at Duvauchelle.
*26 January—Waiau A. and P. at Tuatapere.
26 January—Golden Bay A. and P. at Takaka.
26 January—Palmerston and Waihemo A. and P. at Palmerston.
30 and 31 January—Otago A. and P. at Dunedin.

February

2 February—Banks Peninsula A. and P. at Little River.
9 February—Inangahua A. and P. at Reefton.
16 February—Murchison A. and P. at Murchison.
*22 and 23 February—Buller A. and P. at Westport.
23 February—Kaikoura A. and P. at Kaikoura.
23 February—Manlototo A. and P. at Ranfurly.

March

2 March—Temuka and Geraldine A. and P. at Winchester.
9 March—Cheviot A. and P. at Cheviot.
9 March—Mt. Benger A. and P. at Roxburgh.
16 March—Upper Clutha A. and P. at Wanaka.
16 March—Hawarden A. and P. at Hawarden.
*16 March—Mayfield A. and P. at Mayfield.
30 March—Methven A. and P. at Methven.

April

6 April—Oxford A. and P. at Oxford.
13 April—Malvern A. and P. at Sheffield.
22 April—Strath Taieri A. and P. at Middle march.
*22 April—Mackenzie Highland Show at Fairlie.

* The Department of Agriculture exhibit will be staged at this show.

Trees on the Farm

Collection, Extraction, and Storage of Seed

TREE planters who wish to raise their own plants may be faced with the need for collecting their own seed either because a supplier cannot be found or because they want to be sure of growing a certain good strain. The seed collecting season will soon be here and these notes by W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service, are timely.

GENETICS is of particular importance in tree growing because the results of seed from poor strains take so much longer to become apparent that much valuable time and effort can be wasted. There are unfortunately too many unthrifty stands due solely to the fact that seed for them was collected from trees of species that were easy to collect from irrespective of their form. Furthermore, since cross-pollination is the rule rather than the exception, it is also unwise to collect from an isolated good tree in an otherwise poor stand.

Collection

Usually seed should not be collected from very young or from very old trees; the best seed comes from trees in middle age. Some trees bear good crops of seed only occasionally; as long as 7 years may intervene between "seed years" and this must be borne in mind when collections are being planned. It may be desirable to take advantage of a good year to carry a stock over the lean years.

Cones or other fruit must be ripe before they are collected. Often the colour is a clue to maturity, but sometimes the fruit has to be cut open to inspect the seed. Mature seed should have a brown seed coat and be firm and waxy inside it. On some species (for example, radiata and muricata pines and macrocarpa) cones remain closed on the trees for some time, thus allowing plenty of time for collection.

With others (such as Corsican and ponderosa pines, Lawson's cypress, and Douglas fir) the cones open as soon as they are mature, and at that stage those of kauri, the cedars, and silver firs disintegrate into a mass of cone scales and seed. With such trees seed must be collected expeditiously as near maturity as possible and yet before seed shedding takes place. This means frequent examination of specimen cones to observe the maturing of the seed inside.

Collection from standing trees may be done by climbing the tree, from ladders, or by spreading sheets on the ground underneath. The choice of method will naturally vary with the species being collected; for instance, those whose cones open suddenly might be better collected by laying sheets on the ground round selected trees. The job is much easier with felled trees, but it is necessary to be sure that the cones were mature when felling took place and that the trees were suitable parent types.

For picking from ladders or where the tree is climbed handy containers can be made from half sugar bags. The bag can be tied round the waist or slung over one shoulder.

Extraction

Some seeds are produced singly as in the oak and the ash and the native timber trees. These require no extraction; only hand picking or sieving is necessary to produce clean seed. The seed of a few others is contained in fleshy fruit, which should be softened by steeping in water and the seeds separated from the pulp by several washings. The washed seeds must, of course, be dried as soon as possible, preferably in the sun.

Most seed will be contained in cones (all the conifers) or in capsules

▲ A cone shaker, a box with wire netting sides which revolves on an axle. Seeds drop through the netting.

An oven made for heating very woody cones for → the extraction of seed. It is made from an old, square iron tank. About 3in. of sand is spread on the floor to regulate the heat and the cones are placed in metal trays supported on racks.

(eucalypts, pohutukawa, and some others). The majority of cones or capsules will open fairly readily if spread out in the sun, but some with very woody cones (notably radiata and muricata pines) may require artificial heat to open them in a reasonable time. Where heat is used care must be taken to see that the temperature does not rise above 130 degrees F. or the seed will be cooked.

When cones or capsules are fully open the seed can be dislodged by shaking. If a large quantity is being treated, a wire netting sided box turning on an axle is useful equipment.

Many tree seeds have wings. Some of these are easily removed by "dewing", but others require breaking off by rubbing in a coarse bag. The dewing process involves wetting and then spreading of the wet seed on a sheet in the sun and should be done on a day when there is a moderate breeze, which will blow away the loosened wings.

Cleaning small quantities of seed is best done by sieving it twice; once through a sieve with a slightly bigger mesh to get rid of the large rubbish and once through one of a slightly smaller mesh to remove the small rubbish. Alternatively, a fair degree of cleanliness can be achieved by winnowing.

Storage

Tree species vary considerably in the length of time their seed remains able to germinate. Kauri seed, for instance, is extremely short lived, whereas some hard-coated seeds will survive for several years.

Seed must be thoroughly air dried before storing and all lots should be labelled with name and date of collection. The best temperature for dry storage is between 32 and 40 degrees F. However, some species, such as ash, do best when stratified in sand; a layer of sand is put in the bottom of the container, then a layer of seed, then another layer of sand, and so on. When stratified seed is sown the sand and seed can be sown together.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given from 2ZA Palmerston North on Mondays at 12.33 p.m. during January as follows:—

7 January—"Foot-rot in Sheep", by G. V. Mutch, Livestock Instructor, Department of Agriculture, Palmerston North.

14 January—"Provision of Flushing Feed for Breeding Ewes", by J. A. Graham, Fields Instructor, Department of Agriculture, Palmerston North.

21 January—"Chemical Weed Control in Horticultural Crops", by G. N. Paulin, Horticultural Inspector, Department of Agriculture, Palmerston North.

28 January—"Germination of Seeds: Laboratory and Paddock", by A. V. Lithgow, Officer in Charge, Seed-testing Station, Palmerston North.

Control of Army Worms

By G. L. BANFIELD,
Instructor in Agriculture, Department of Agriculture, Thames

THE army worm menace has been in New Zealand ever since the country was first settled and epidemics have been reported as far back as the 1860s. The past two seasons have been very favourable to the building up of large populations of this caterpillar and extensive damage has been reported in many parts of New Zealand.

IN the North Island the diet of the army worm is restricted to mainly the grasses and cereals, of which maize appears to be the most frequently devastated. Epidemics occur usually from the middle of February to the middle of May, March and April being the worst months. Paddocks from which hay has been cut, or pasture growth which has not been satisfactorily controlled by grazing appear to be most popular with the caterpillars. In the South Island epidemics may occur in December and January, the chief interest of the caterpillar being grass seed and cereal crops.

Farmers often wonder where the hordes of caterpillars come from, but work at Canterbury Agricultural College, Lincoln, has shown that each female moth is capable of laying up to 1000 eggs, and provided the weather is suitable for sufficient caterpillars to survive the winter they can produce epidemic populations on any given area of pasture without the necessity of invasion from outside areas.

Baits, Sprays, and Dusts

Fortunately the caterpillars can be effectively controlled with baits, sprays, or dusts. However, farmers must keep a close watch on their crops and pastures, since a delay in treatment of only one day can lead to considerable losses.

Until recently baiting has been the standard method of control and the bait which has been used with success in the Auckland Province over the last 8 years has consisted of 25lb. of bran, 4lb. of molasses, and the equivalent of 1/10lb. of para para isomer DDT per acre. The bran and DDT are mixed thoroughly in a concrete mixer before the molasses, dissolved in hot water, is added. Sufficient water is used to produce a fairly dry mash, such as would be fed to poultry. This is broadcast like grass seed over infested areas or may be laid across the path of caterpillars which are on the march.

Recent work in Canterbury has shown the effectiveness of the following treatments in the control of army worm caterpillars:—

In pure cereal stands: Either ½lb. of p.p.i. DDT per acre as an aerial spray (equivalent to 1 quart of 20 per cent. DDT emulsion, costing about 11s. per acre for materials) **or** 1lb. of p.p.i. DDT per acre mixed in 8 to 10 times the quantity of superphosphate or lime as an aerial dust.

In cereal crops undersown with pasture: Two pounds of p.p.i. DDT per acre in superphosphate or lime as an aerial dust. This dosage will control army worm and will also protect the pasture from grass-grub and subterranean caterpillar attack. Heavy rain immediately after the use of bait, spray, or dust will reduce the effectiveness of the treatment.

Trials at Wairoa have demonstrated that the new insecticide dieldrin is also effective for the control of army worm. This can be applied in emulsified form as a low-volume spray and has given completely satisfactory results when applied at rates of 1 to 1½ pints of 15 per cent. dieldrin per acre, the higher rate being recommended to cover the possibility of inaccurate spraying or effects of dilution by rain. The caterpillars stop feeding 6 to 10 hours after treatment and become almost completely paralysed after 22 to 24 hours.

Whether the ryegrass comes away again after attack by army worm depends entirely on the progress made by the caterpillars before they are found by starlings and sea-gulls or treated by the farmer. Where, after rain, there is no sign of recovery of the ryegrass oversowing should be carried out as soon as possible.

Warning

THE materials recommended in this article are highly toxic to honey bees and other beneficial pollinating insects. Though the treatment of non-flowering crops (pastures) as recommended in the article is not likely to have any serious harmful effect on these insects, operators must nevertheless exercise the utmost care to prevent spray (dust) drift on to neighbouring crops or pastures, particularly those in the flowering stage, or on to hives of honey bees in the vicinity of the area being treated. Before control measures on the lines indicated are undertaken the local instructor of the Extension Division of the Department of Agriculture should be consulted.

No portion of this article may be reproduced unless it is accompanied by the warning in the preceding paragraph.

Fodder Crop Production in Otago and Southland

FARMING in Otago and Southland is predominantly pastoral. Of the 2,900,000 acres that have been cultivated 2,600,000 acres are in pasture and about 275,000 acres are used for annual crops. The bulk of this cropping is done to supplement the pastures for feeding livestock. Crops for human consumption take only a small part of the total crop acreage. About 20 per cent. of the crop acreage is devoted to cash crops for sale off the farm and the remaining 80 per cent. is used on the farm. In this article A. H. Mouat, Farm Economist, and A. Stuart, Assistant Fields Superintendent, both of the Department of Agriculture, Dunedin, analyse the trends in pasture and fodder crop production in Otago and Southland.

GRASS and clover pasture is the main crop of the farm, and the farmer aims to maintain his pasture in high production. Cropping plays a dual role in relation to pastures: To provide supplementary feed for livestock and to renew the pastures. Good feed crops can raise the stock carrying capacity, which, without such crops, is limited by the low pasture production over winter. Supplementary feed crops are grown mainly for use in winter, early spring, and late summer.

Most pastures tend to deteriorate with infestation by weeds and inferior grasses, particularly browntop. When pastures require renewal the growing of one or more annual crops is an economical method for two reasons: The crops benefit from the build-up in fertility while in pasture, and the crop rotation cleans the land for the establishment of a new pasture. A crop rotation is designed with this objective in view, but in Otago and Southland strict rotations are seldom followed, and the rotation is varied to suit the immediate requirements of the farm management programme.

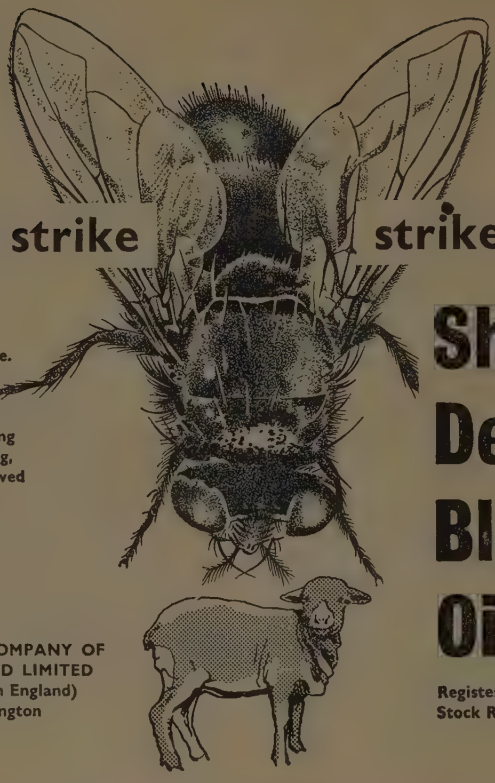
Though it is true that the first crop out of lea ground is usually turnips or swedes, the second crop may be one of several forage or cereal crops. In each district farmers have adopted a rotation to suit their local conditions of soil and climate and method of farming.

On the South Otago downlands where land development from browntop is progressing rapidly 36 per cent. of crop rotations include only one crop of swedes before the pasture mixture is sown, usually with rape; 42 per cent. grow two crops and 22 per cent. more than two crops before the pasture seeds mixture is sown. On the well-established farms with high producing pastures the crop rotation may be a lengthier one including one or more cash crops.

Ratio of Crops to Sown Pastures

The ratio of crop acreage to sown pastures varies from district to district according to local conditions. For Otago and Southland as a whole the ratio is 1 acre of crop to 9 acres of sown pasture (1 : 9). In districts that are being rapidly improved such as parts of South Otago the ratio is high at 1 acre of crop to 2 acres of sown pasture (1 : 2). In the arable and generally lower rainfall areas the ratio is 1 : 6, and the dairy farms on the fertile Taieri Plains show a ratio of

HEADING PHOTOGRAPH: Lambs fattening on Clubroot Resistant rape at Morrisons, North Otago, in March. A large part of Otago and Southland is hill country where cultivation is steadily increasing and extending to higher slopes.



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1 : 8. Other predominantly grazing districts which have no cash cropping show a lower ratio of 1 : 12 to 1 : 20 acres.

The percentage of farm area in crops tends to be high where land improvement work is widespread or where the land is suitable for cropping. On the downlands in South Otago 19 per cent. of the farm area is in crop or fallow, and on the plains of North Otago 15 per cent. is in crop. In the more extensive sheep farming district of the Maniototo Plain only 6 per cent. of the farm area is in crop or fallow.

Fuller use is today made of pastures than in the past. With good prices for livestock products and small seeds the farmer has concentrated on improving his production from pastures. Sown pastures represent 23 per cent. of the occupied land in Otago and Southland. Of this occupied land, half is held in high country runs and more than half is unploughable. The acreage sown to new pastures has increased from 144,000 acres annually just before the Second World War to 155,000 acres in recent years.

The acreage of pasture and lucerne saved for hay or silage has increased from 49,244 acres just before the Second World War to 99,000 acres in late years. The acreage cut for seed has also increased in this period from 38,910 acres to 43,510 acres. The area that is saved for hay varies widely from an average of only 3 per cent. of total farm area on sheep farms of South Otago to a 20 per cent. average on dairy farms on Taieri Plains. Where pasture seeds are an important item in farm income 10 per cent. or more of the farm area may be reserved for this crop.

Breeding ewes on a break of Crimson King swedes in June at Waianiwa, Southland. The swede crop is of great importance in the higher-rainfall districts of coastal Southland and South Otago.

Trends in Cropping

In spite of the increase in the acreage of new pastures the total area in field crops shows a drop over the 15-year period up to 1954. The acreage in grain and pulse crops has fallen from an average of 139,000 acres to 84,000 acres. This drop is due to a sharp decline of 44,000 acres in oats sown for chaff, hay and silage, and feeding off and a drop of 14,000 acres in oats for threshing. On the other hand, the wheat acreage has increased by nearly 3000 acres in this 15-year period. Not all grain crops are sold off the farm. Only 66 per cent. of this acreage is threshed for grain; 96 per cent. of the wheat and only 39 per cent. of the oat acreages are threshed, and the balance may be made into chaff, hay, or silage or grazed by livestock.

In Otago and Southland turnips and swedes are most important feed crops and still occupy more than half the total crop acreage, though there has been a slight drop in acreage used for these crops. Green fodder crops, including rape, kale, chou moellier, and ryecorn, have risen greatly over this period to meet the demands of increasing numbers of sheep and lambs. The increase is from 54,000 acres before the war to the present 95,000 acres.

Crop Yields

Over the past 30 years the average yields of wheat and oats have increased, especially in Southland. The

Waiareka Valley in North Otago has a rich, "tarry" soil for arable farming and the ratio of crops to grass is higher there than on the downlands beyond, where sheep farming predominates. Wheat and small seeds are profitable cash crops there and a large acreage is devoted to feed crops for livestock. Photograph by J. U. Macaulay.

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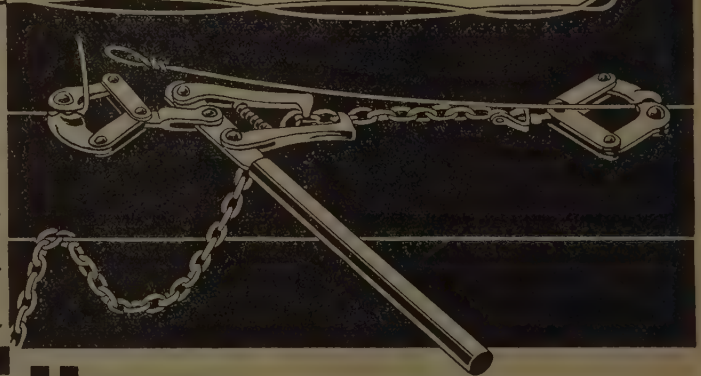

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average yield of wheat in Otago has improved from 30 bushels per acre to 45 bushels and in Southland it has risen from under 35 bushels to about 50 bushels per acre. Average yields of oats have risen from 40 bushels to almost 50 bushels in Otago and from 45 bushels to 70 bushels in Southland.

These figures indicate the improvement that has resulted from the use of good seed, lime, and fertiliser under improved farm management. Higher yields as a result of improved fertility of the soil are illustrated in South Otago where on similar soil types the more highly developed farms with good management average 62 bushels of wheat per acre compared with 49 bushels on the less developed farms.

It is also found there that the farms earning high net returns have on an average 40 per cent. of their farm area in pasture under 6 years of age compared with 27 per cent. on low-earning farms. Consequently there is a greater crop acreage on the former with 20 per cent. in crops than on the latter with 14 per cent. of the farm area used for crops. More and better crops and sown pastures have enabled the high-earning farms to carry 71 per cent. **more livestock** through winter and assisted them to earn 19 times the net returns of the low-earning farms.

Winter Feed Crops

Of the winter feed crops grown, swedes, with yellow-fleshed turnips and white-fleshed turnips, provide the bulk of the feed produced for late autumn, winter, and early spring feed supplementary to grass and hay. Swedes are most popular in districts of relatively high rainfall, and accordingly they are grown mainly in the coastal districts of Southland and South Otago in particular. Yellow-fleshed turnips are grown in the drier inland portions of Southland, where conditions do not suit swedes. Varieties resistant to club root often follow the swede crop.

In Southland the acreage of swedes grown on the majority of sheep farms usually allows 1 acre for each 100 ewes, and 50 tons per acre is the normal yield obtained. If a lower yield is usual, an increased acreage is grown. The yield of yellow fleshed turnips is about half that obtained from the swede crop, and consequently double the acreage is required. Ewes at one time were expected to exist on turnips for 3 months of the year, but of late years this period has been reduced to 6 weeks or less by many farmers.

This reduction has been brought about almost entirely by the provision of saved grass, and for which short-rotation ryegrass is most valuable. Not only are special pastures of short-rotation ryegrass grown, but this grass now forms a valuable constituent of most permanent pasture mixtures. Swards containing this grass make

The baling of hay in progress on a large sheep station in North Otago on land that has been improved from fescue and tussock by cultivation and the use of Certified pasture seeds and phosphatic fertiliser.

▼ These lucerne fields on the Maniototo Plain are used for both hay and grazing. The first cut of hay is in the stack. A small field of turnips on the left is for winter feeding with lucerne hay. The acreage in lucerne is increasing in the drier districts of Otago.

growth available easily a month to 6 weeks earlier than those sown with Italian ryegrass, which barely survived into the second year.

White fleshed turnips are grown mainly by the dairy farmer and are fed in autumn to supplement grass. The variety N.Z. Green Globe is popular and if sown in December can be expected to keep through winter and is often relied on for this period by the sheep farmer.

Chou moellier or thousand headed kale crops usually follow the swede crop, but in those districts where swedes are not suited these crops often are the first taken after grass. Both crops are resistant to club root, and aided by their deep and massive root system, they provide a great bulk of feed even under the low rainfall conditions that prevail in North Otago.

On heavy ground and under moderate rainfall chou moellier crops of 40 tons per acre are common. Kale under the same relative conditions is much lighter in yield, and 25 to 30 tons would be regarded as excellent. Both crops are generally fed in late autumn or early winter. Chou moellier crops are often kept even later, but care must be taken to ensure that the crop is used before flowering begins.

For sheep feed it is usual to sow the seed at a higher rate to ensure that the stalks do not grow excessively and beyond the eating capacity of the animal. For cattle, on the other hand, chou moellier may be thinned to 12in. to 18in. apart in the rows. Thinned in this way, chou moellier yields the maximum of green matter.

With all the foregoing crops the general practice is to ridge the crop in 24in. to 28in. ridges. With the advent of the tractor 4-row ridgers became common, replacing the 2-row horse drawn implement. Fertiliser is applied at two levels, that from the front box falls below the seed and that from the back box falls with the seed.

It is usual to apply 3 to 5cwt. of reverted superphosphate at ridging, the larger quantity being used with chou moellier and kale, as these crops are gross feeders. It is also usual to apply borax where necessary at 5lb. per acre through the front box of the ridger. This is generally bought in the form of borated reverted superphosphate ordered as a special mixture.

Where molybdenum is deficient, as on certain known soil types, good responses are secured in all brassica crops by applying as little as 2½oz. per acre of sodium molybdate. This may be bought as molybdenum reverted superphosphate and applied through the back box of the ridger with the seed.

In the lower rainfall districts the seed is often sown by drill, every second or third coulter being used. In districts of intermediate rainfall crops are often ridged and the ridges rolled. This guards against wind erosion, secures consolidation, and aids germination. Whether the crop is ridged or drilled the ground is invariably rolled immediately before sowing.

Few brassica feed crops are grown in Central Otago, as the conditions are too hot and dry, but it is in this locality that the bulk of New Zealand's seed requirements of swede and turnip varieties is produced. For this purpose seed is drilled in 7in. rows about March, and the crop is harvested at the New Year.

Fattening Crops

The chief fattening crop is rape, and its main use is for fattening lambs. In the drier districts where yields are low it may be possible to fatten only 10 lambs to the acre, whereas in Southland where heavy yields are common 40 to 50 lambs to the acre may be fattened.

If rape is sown alone as a crop it may be ridged similarly to swedes, but more generally it is sown as a nurse crop to grass, when it is customary to sow it through every second or third coulter of the drill. In this way a heavy crop of rape will not have the same detrimental effect on grass establishment as would a broadcast crop of the same tonnage.

The other consideration is that rape is very susceptible to club root, and if sown in the rotation after a cruciferous crop which showed evidence of attack, it may be wiped out completely by club root. If there were a risk of club root attack and the need for lamb fattening feed were imperative, it would be wise for the farmer to ridge each year a certain acreage of rape immediately after grass. Any additional rape available from that sown with grass could be used by bought-in store lambs if necessary.

Other crops such as blue lupins (Sweet and Bitter) have been tried out for fattening, but with little success. The only fattening feed comparable with rape is swede tops. These are occasionally used, but only in emergency, as the ultimate growth of the swede bulb is reduced by the removal of the green leaf at a critical stage of growth in early autumn.

Rape takes longer to mature in the south, and a period of 10 to 12 weeks is common. In Southland lamb feed is generally required in February and March, but in Otago it may be required earlier. It is generally fed in breaks, and to secure feed at the right stage of maturity blocks are generally sown at intervals of 3 to 4 weeks. The later-sown crops, because growing conditions are then better, reach maturity more quickly than the earlier sown crops.

Cereal Greenfeed Crops

With the exception of that in North Otago and the Hawea Flat districts very little wheat is autumn sown, and consequently little greenfeed from this crop is available in early spring.

In Central Otago and eastern Southland ryecorn is a popular crop for greenfeed. It is usually sown in early autumn after a fallow, a cereal crop, or a brassica seed crop, and is grazed in late autumn or early winter and again in spring. It is then often allowed to grow on for a grain crop.

In western Southland Dun oats are frequently sown in autumn for grazing in early spring by ewes before lambing. This practice helps in warding off attacks of ante-partum paralysis likely to occur when grass growth is scarce. A grain crop is then usually taken as with ryecorn.

Barley of the feed type is also used throughout Otago and Southland for the same purpose. It is quicker growing than Dun oats and feed in late autumn or early winter is secured in addition to the valuable spring bite. Seedings of 2 to 3 bushels are usual, the heavier seedings applying to the higher rainfall districts.

In Southland greenfeed crops may follow a cereal crop, an early fed-off soft turnip crop, or they may follow grass before a crop of turnips.

Fertiliser applied with the seed of all cereal greenfeed crops is 1 to 2cwt. per acre of superphosphate or reverted superphosphate. The higher quantity is again used in the higher rainfall districts.

Other Supplements

In a favourable season for grass growth large quantities of hay are made throughout Otago and Southland. Silage is not popular, largely owing to the difficulties of feeding it out to stock. However, after a dry spring, the quantity of hay made is much reduced, as the stock, particularly ewes and lambs and the dairy herd, cannot be stinted at that period. A proportion of the farm is under the plough, and this percentage is generally greater than would be the percentage of a North Island farm closed for hay production. The farmer in Otago and Southland safeguards his winter feed position not so much by hay as by crops.

It is true that in Otago lucerne hay provides an adequate safeguard for winter feed, particularly in the drier districts such as Central and North Otago. In addition many farmers in these drier parts frequently graze large areas of lucerne during the growing period from September to April as required.

Lucerne grown mainly for hay is increasing slowly in other parts of Otago and Southland, but the average farmer still relies on the brassica crop to winter his steadily increasing stock numbers.

Propagation of Plants in the Flower Garden

THE home gardener can derive much pleasure from raising his own plants, and at the same time save money. Some plants for the flower garden can be raised from seed, but for others vegetative propagation must be resorted to. In the following article K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch, discusses various methods of propagation which can be carried out fairly readily by home gardeners. Notes on flower garden work in January are by Elspeth Gray, Horticultural Instructor, Department of Agriculture, Auckland.

ANNUAL plants are always raised from seed and they generally come true to type. There are, however, many hybrid plants which do not set seed readily, are too slow in reaching flowering size when raised from seed, or do not come true to type from seedlings. Various methods of vegetative propagation can be used in raising these subjects, and as it is always part of the parent plant which has been separated and grown on, the new one will be identical.

Some can be divided or separated so that a portion of the old plant becomes a new plant, and others are propagated by cuttings. These develop roots and become new plants. Some plants which are difficult to root from cuttings can be layered whereby a cutting is only partly severed from the plant and encouraged to make root. Some are propagated by budding on a rooted stock, which apart from enabling a plant to become established may impart certain properties such as vigour, dwarfing, disease resistance, and hardiness.

Some plants are extremely difficult to propagate, requiring as well as skill special propagating structures with suitable heating facilities.

But there are many plants the home gardener can raise and it is pleasing to remark to a friend: "Do you remember the slip you gave me last year; there you see the plant I grew from it".

Frames and Cloches

The nurseryman raises many plants in glasshouses where it is possible to control temperature, humidity, and moisture content of the soil. When plants are grown outside they are subject to the weather, which for tender seedlings and unrooted cuttings may cause them to die. It is therefore advisable for home gardeners intending to raise plants to provide some protecting structure for them.

A small frame is easily made from a few boards and can be covered by a loose sheet of glass; materials which are often lying in the shed. Such a frame will assist in the raising of plants, as at least it will give protection from wind and rain.

Larger frames are usually more satisfactory for raising plants than smaller ones not only because of the greater expanse but also because it will generally be found that the greater the undertaking the greater the attention given to it.

Cloches are useful too, especially the barn type where there is a good volume of air between small plants and the glass. Cloches have the advantage in being narrow, so that moisture will penetrate from the outside during watering and rain, there-

A variety of plants can be raised from cuttings in a cold frame.

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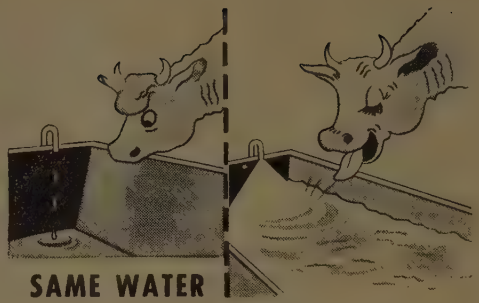

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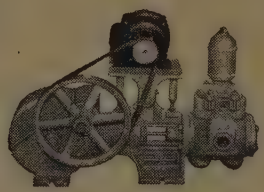

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Plants that cannot be separated by pulling them apart should be cut into sections.

by often obviating the necessity of direct watering on to small seedlings.

Where only a few seedlings or cuttings are raised at a particular time the small lantern cloches can be useful. They are 6in. square and the top can be opened to facilitate gradual hardening off of the plants, as can also be done with the barn cloches.

If no other protection for the plants is available, a few can be kept under a preserving jar. For cuttings this can be quite satisfactory, as a close atmosphere is achieved with no loss of humidity, but a disadvantage is that ventilation can only be given by lifting the jar off the ground.

A lot of work has been done overseas with the use of polyethylene sheeting in plant propagation. It has been found suitable for covering greenhouses with instead of glass. Such plastic may last up to 3 years when exposed to sun and weather, but even if it will only last a year, it is a cheap material. This idea can be applied to covering propagating structures in the home garden.

The value of plastic sheeting is that it will admit light and allow exchange of gases, but moisture vapour cannot penetrate. When it is fitted airtight the plants or soil will dry out very slowly, but an exchange of gases is assured.

Special attention must be given to plants growing under plastic, as the condition of high humidity is also very suitable for the development and spread of fungous diseases. Plants must also be hardened off very carefully, as they become very soft when growing under these conditions.

Seed

Some annuals are best sown directly in the border or bed where they are to flower. They are mainly the plants which flower for a fairly short period, such as candytuft, cornflower, linaria, mignonette, night-scented stock, and shirley poppy.

If these plants are pricked out and transplanted, they are liable to be checked in growth, which will result in their running into bloom before they are properly developed, and flowering may be poor and of very short duration.

The soil should be moist, well cultivated, and broken down to a fine tilth before sowing. The seed should be sown thinly and only lightly covered, as most of this seed is fairly small; seedlings should be thinned to an adequate spacing before they are too big.

Better results are claimed for asters, stocks, and zinnias grown in this manner.

Annuals that flower for an extended period and any bedding plants which are not true annuals but generally are treated as such, often grow better if sown in a seed-bed or box and pricked out. They will then develop a stronger root system before they are finally planted out in their permanent positions.

Many herbaceous perennials can also be raised in this manner, but in some cases they are highly bred hybrids and may not come true to type and seldom true to colour. A good example is the modern delphinium which may become any colour, no matter what the seed parent was like.

For the home gardener there are some advantages in sowing direct in

Lantern cloche (left) is useful for raising cuttings, or a preserving jar (right) can be used.

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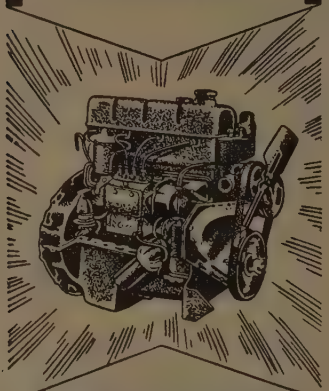

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a seed-bed protected by glass instead of using boxes as is the commercial practice. Boxes with seedlings require special watering; sometimes it may be required several times a day, which may not be possible in the home garden. If the plants are in the open ground, they have much more chance of tolerating indifferent treatment.

But no matter where the seed is sown the soil should be in the best possible condition for plant growth.

Sterilised soil is preferable, but if used in boxes, these should also be sterilised, or little is gained. This subject is fully dealt with in Department of Agriculture Bulletin No. 363, "Disinfection of Nursery Soil", which is available free from any office of the Department of Agriculture.

The soil mixture should conform as much as possible to the well-known John Innes composts. These mixtures contain peat of a type that is not readily available in New Zealand, and leafmould is generally substituted to make up the following mixture for seeds sowing:—

2 parts (by volume) of loam
1 part (by volume) of leafmould
1 part (by volume) of coarse sand

For each bushel add 1½oz. of superphosphate and ¾oz. of lime (an apple case contains approximately 1 bushel)

The soil should be well moistened but not sticky, and well firmed when the seed is sown. For small seeds, only a fine covering of soil is required; a good rule is to make the covering equal to the thickness of the seed.

Covering the seed boxes with a sheet of glass and paper will prevent loss of moisture and assist germination.

Lily scales showing root development and bulbil formation.

The pricking out of seedlings should be done as soon as the seedlings are big enough to handle. The seed-bed or box should be well watered some hours before, so that the plants are in the best condition for the shift. The seedlings should be handled with care so that they are damaged as little as possible. They should be gripped by the leaves, never by the stems, as the pressure of the fingers can bruise the soft tissues.

The soil for pricking out in can be the same type as was used for the seed, but if the plants will remain for a while before being planted out a stronger medium may be more suitable. The John Innes potting compost can then be used. It is made up from the following:—

7 parts (by volume) of loam
3 parts (by volume) of leafmould
2 parts (by volume) of coarse sand

For each bushel add 1½oz. of dried blood, 1½oz. of superphosphate, ¾oz. of sulphate of potash, and ¾oz. of lime

Division and Separation

Of the vegetative methods of propagation division and separation is the easiest one for the home gardener to carry out.

It is done by removing part of the plant with some roots attached and growing it on. It is used extensively in propagation of herbaceous perennials and plants with rhizomes or tubers, most of which subdivide underground and develop a number of shoots or crowns.

Division of bearded iris is done soon after the plant has flowered. On large plants the foliage should be reduced as shown.

The plant to be divided should be lifted so that it can be properly examined. A decision can then be made on how to split it up, though this usually depends on the number of new plants required. Division is generally best carried out when the plant is in its greatest dormancy.

Many herbaceous perennials, such as michaelmas daisy, golden rod, and shasta daisy, form large clumps and should be replanted frequently. When material for new plants is selected the strongest growths are found at the outside of the clump; a few of these should be cut off and planted. Chrysanthemums are in this group and only one shoot is needed for a new plant.

Other herbaceous plants which do not multiply so vigorously may have the crowns divided, but it is seldom wise to split them up into very small pieces, as their establishment may then be very slow.

Some plants, such as echeveria (hen and chicken), put out offsets or runners. These develop from the base of the parent crown and at some distance away a new crown will appear which in many cases will form its own roots. If rooted, the new plant can be cut free, dug up, and shifted. If no roots have developed, an inch or two of the connecting stem should be left on the new plant and when planted the "stem" below the crown will soon put out roots. Little attention is needed for succulents of this type, as they root freely.

Other plants develop shoots from a rhizome which may be either underground or creeping along the ground and usually held firm by roots.

Carnation cuttings being prepared and inserted in pots for rooting. Note crocks which are used in the bottom of the pots to assure good drainage.

In propagation the rhizome is cut into sections, but at least one shoot or bud should be present for each new plant. The pieces should be planted horizontally just below the surface and roots will soon develop.

Bearded iris is in this group. It is best devided in summer soon after flowering is finished. To reduce loss of moisture while the plants are establishing the top half of the leaves should be cut off.

There are different kinds of tuberous plants. Dahlias will only break from buds which develop on the base of the previous year's flower stalk; tubers without this "neck" will not grow into plants. This must be taken into consideration in propagation and it is therefore best to divide dahlias in spring after the buds have formed. The size of the tuber for the new plant does not appear to be significant and one bud is sufficient to make a good plant.

Tuberous begonias must be treated differently because they form only one tuber, which expands in size with age. The tuber can be cut into sections, and again at least one bud must be present on each piece or it may not grow. After begonia tubers are cut the cut surfaces can be dusted with flowers of sulphur to prevent rot. They are best started into growth by shallow planting in boxes of John Innes potting compost; the top of the tuber should not be covered. A warm position is essential until they grow away.

Tuberous plants, such as dahlias and begonias, can also be propagated from soft-wood cuttings if additional stock is required. Shoots should be taken close to the tuber as soon as they are large enough, and rooted under glass. For further details see the section on soft-wood cuttings.

Bulbs and Corms

Bulbs and corms multiply naturally by division and offsets. Bulbs act in slightly different ways. Some will divide each year into separate bulbs;

Carnation cuttings showing stage of development when they should be potted up or planted out if rooted in sand.

a clump of tulip bulbs will fall apart when the roots dry, but narcissus, for example, will not split up the same year as multiplication has taken place and "double-nosed" bulbs are obtained. The principle is the same, however, and only slightly different with corms.

But apart from multiplication into bulbs and corms of varying sizes, bulbils and cormlets are also formed. These are very small and generally take several years to develop to flowering size, but are the means whereby a greater increase in stock can be achieved.

On lilies bulbils may form at the bases of the bulbs, on the bases of the stalks of stem-rooting varieties, and some varieties form aerial bulbils where the leaves join the stem.

On gladiolus cormlets are found as offsets at the bases of the new corms. They may become detached if the corms are left in the ground longer than required for ripening (6 weeks after flowering).

In general bulbils and cormlets are all treated alike. They should be planted fairly shallow in a position where they will not be forgotten or the varieties mixed up. If many are grown, it is best to line them out in rows, and mark them clearly with labels.

The time for planting varies, but they should be treated in a similar manner to the bulbs or corms from which they grew. Lilies should never be left out of the ground for long, and the bulbils should be planted immediately so that the tiny roots will not shrivel up. Gladiolus cormlets are not planted until spring.

Lilies and hyacinths can also be propagated by scales. Lilies have been produced commercially in this manner for years, but for hyacinths the method is a recent development and not yet extensively used.

The outer scales should be carefully removed at lifting time. The hyacinth scales can be cut into sections from top to bottom about an inch wide. Both scales and bulbs should be treated with a thiram-based dust to prevent fungous infection of the wounded areas. The scales should be planted separately in sand or sandy soil in a box or covered frame. They can be completely covered or have the top of the scale protruding. A warm position is essential until bulbils have formed, usually after some months, following which they should be grown on under cooler conditions. It is not wise to transplant the bulbils until they have rooted properly and great care should be exercised in handling them.

By the propagation of hyacinths in this manner the parent bulbs will still flower the following season, whereas by the method used previously the bulbs used for bulbil production are sacrificed.

Soft-wood Cuttings and Half-ripened Cuttings

Soft-wood cuttings are, as the name indicates, made from growing wood which is soft in texture. The growing tip is used and may vary in size according to the size of the shoot, but very small cuttings are difficult to handle with the facilities available in the home garden. In general, the length should be 3in. to 4in.

Plants which are herbaceous in habit can be raised from quite new tissue and many are best propagated as soon as the shoots grow away in spring.

Woody and semi-woody plants do not usually grow so fast and a greater percentage of "strikes" is obtained if the new shoots are allowed to harden before the cuttings are taken. They are known as half-ripened cuttings and can be made in early summer to mid-summer. These are often called half-ripened cuttings.

For both these types of cuttings it is better to use shoots that are approximaely the correct length when removed from the plant so that the base is cut off close to the old growth. Side shoots can often be used; for example, the best carnation plants are made from shoots forming on old flowering stems. They should be pulled off with a downward movement and only need to have the base trimmed clean.

Where the cutting is not pulled off the basal cut should be made just below a leaf or leaf scar and always with a very sharp knife. The lower leaf or leaves should be removed and if the foliage is excessive, some of it can be trimmed off to prevent too great a loss of moisture.

Sand is often used as a medium for rooting cuttings and should be free draining and not too fine. If cuttings are put straight into the garden, some sand should be mixed with the soil to open it up and provide better drainage. Soft-wood cuttings should be planted firmly 1in. to 1½in. deep and watered in.

Some people have "green fingers" and can strike cuttings anywhere, but best results are usually obtained with this type of cutting if they are rooted under glass.

Cuttings must be adequately watered. They should never be allowed to dry out and for the first week or two gentle overhead watering should be given when they droop. Shading must also be provided during this period. The atmosphere should be kept as humid as possible and ventilation should not be given until the plants appear to have settled down.

Roots can be assumed to have developed when the cutting becomes fresher in colour and appearance. Shoot growth will commence soon after. Ventilation should then be gradually increased to harden the plants. If cuttings are rooted in sand, they should be planted out or potted up before they become spindly. That will quickly happen, as sand though excellent for rooting cuttings, provides little nourishment for growing plants. John Innes potting compost can be used.

Cuttings of Ripened Wood

Many deciduous trees and shrubs can be raised from hard-wood cuttings. They should be made from ripened wood that grew the previous season and are usually made some 8in. to 10in. long. The basal cut should be made as is described for soft-wood cuttings. It should be just below a leaf or leaf scar and the top should be cut off just above a leaf or bud. The cuttings should be planted firmly in ordinary well-drained garden soil to a depth of 5in. to 6in.

Many evergreen plants, especially conifers and those used for hedges,

▲ Root cuttings, showing methods of preparation and vertical insertion in a box.

▼ Rooted cuttings of begonia leaf, showing leaf section and steel peg used to hold down leaf.

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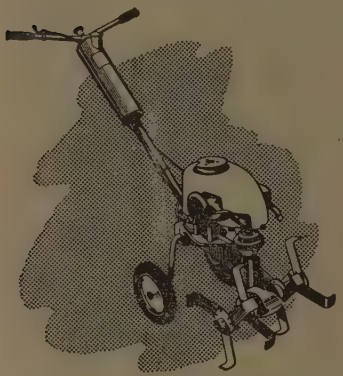

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▲ The cut surfaces of an air layer must be kept apart before the covering sphagnum moss is applied.

▼ A finished air layer covered with polyethylene.

can be grown from cuttings. They can be prepared in the same manner as soft-wood cuttings. Those for hedge plants are usually made larger and it is not necessary to use the tips of the shoots only; they can be made as described for deciduous hard-wood cuttings and inserted in ordinary garden soil.

Cuttings of conifers are very slow rooting and are better placed in sand and should be protected from strong sun and wind.

The best time to take cuttings of ripened wood is during autumn. If they are taken in spring, the buds may grow and exhaust the food supplies in the stem before roots are formed. If this happens the cutting will die.

Root Cuttings

Some plants can be propagated by root cuttings; for example, Oriental poppy. By this method a piece of root from suitable plants can be used without giving consideration to shoots or buds as is necessary with tubers and rhizomes.

The roots are cut into pieces 2in. to 3in. long; they can be planted horizontally about an inch deep or upright as shown in the illustration on page 619. If the root cuttings are planted upright, the lower end should be cut on the slant so that the cutting will be planted the right way up. Sand or sandy soil should be used and protection by glass is desirable.

Leaf Cuttings

Some plants do not provide suitable material for the types of cuttings described, but may be propagated by leaf cuttings. Among these are begonias, gloxinias, saintpaulias, lachenalias, and many succulents. Bulbil production from bulb scales, which has been described, is really a method of propagation by leaf cuttings.

Mature leaves should be selected and small parts of the stalks left on. They should be planted and where the leaves are large they can be kept in position by wire staples or a few pebbles. On some plants, especially foliage begonias, the veins of the leaves can be cut in various places, which will result in their rooting at the cuts also.

Leaf cuttings should be given the same treatment as soft-wood cuttings.

Root formation from suitable leaves is fairly quick and will be followed by development of a shoot, tuber, or bulb, according to the habit of the plant and should be treated accordingly.

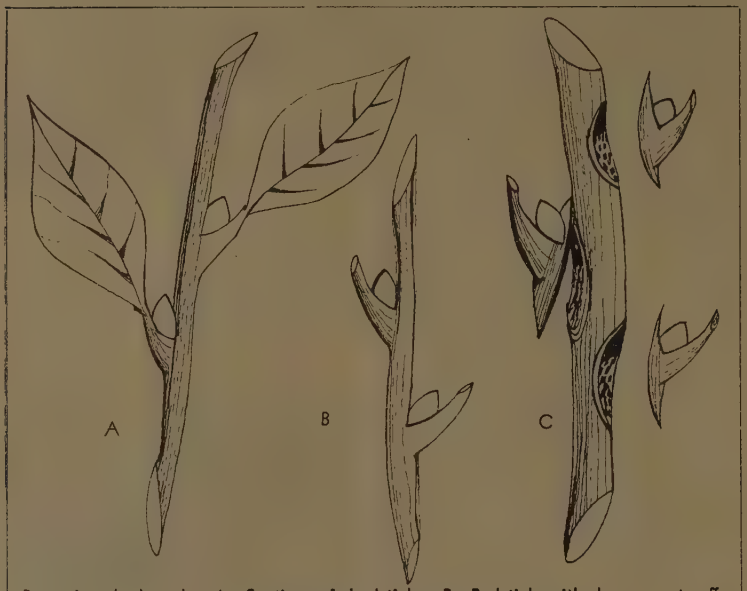
Layering

Layering can be carried out in home gardens where facilities for propagation by cuttings are not the best.

In principle this method is rather like that of growing from cuttings, the difference being that the cuttings are

▲ Preparation of a stem for layering.

▼ Method of pegging down and covering of a layer.



Preparing budwood. A—Section of budstick. B—Budstick with leaves cut off. C—Shield buds removed.

not completely severed from the parent plant, but cut only half through. They are then induced to root and when roots have formed they are cut from the parent plant and treated as rooted cuttings.

Many plants that are difficult to grow from cuttings are raised in this manner commercially, perhaps the best known of them among amateurs being carnations and rhododendrons.

Young growth should be selected, and it should be growing in such a position that it can be bent down to the ground. If necessary, leaves should be stripped off and a cut is then made on the lower side of the stem half-way through and lengthways for an inch or two to enable the cut ends to be kept apart. The wounded part is then buried an inch or two in soil that has been prepared if necessary with additional leafmould and sand. Usually the cut will be kept open by the bend of the stem; otherwise a sliver of wood or a little sphagnum moss can be used for that purpose. If necessary, the layer can be kept in position with a small stone or peg. The illustrations at right on page 621 show details.

Layers should be made at the normal time for taking cuttings of the particular plant.

Air Layering

Sometimes it is not possible to carry out layering as described, because the young growth of a plant cannot be bent down to the ground. Nurserymen may cut a plant down to make it produce shoots at a lower level, but that would seldom be done in the home garden.

Since polyethylene has come into use in horticulture air layering has become a practical method for outside use. In the past it was confined to plants in glasshouses and required constant attention.

The plants are prepared as for ordinary layering, but instead of the cut surface being buried in the ground moist sphagnum moss is wrapped around the wound. It is important that the moss is only just moist; all excess moisture should have been squeezed out. The moss is then covered with polyethylene sheeting, preferably a piece of tubing which will be airtight. The ends should be wrapped around the stem and carefully sealed with insulating tape in such a manner that no moisture can escape.

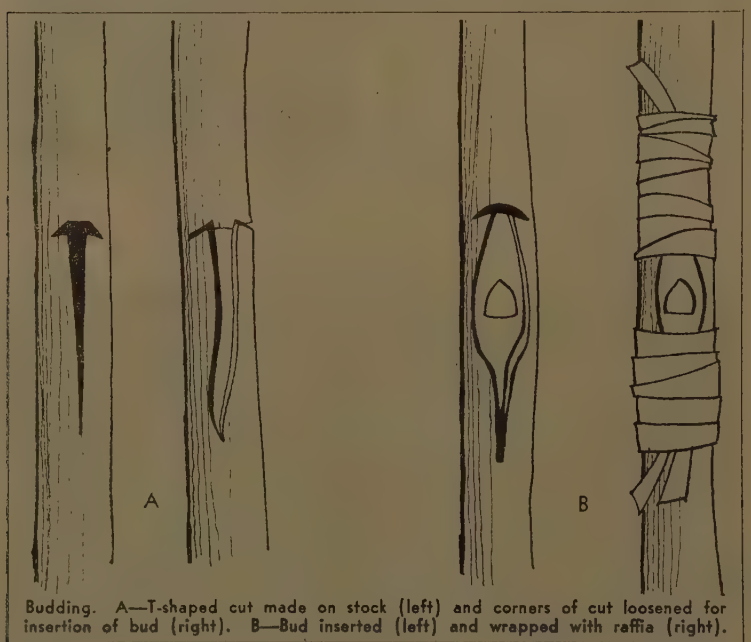
Provided a tight seal has been made, no attention should be required until the layer has rooted and the new plant can be cut away for planting. Root development can be observed through the plastic.

Budding

Though budding is carried out in the propagation of many plants by nurserymen, its main use in the home garden is in rose culture. The hybrid tea varieties do not all grow easily from cuttings and standard roses can, of course, only be grown by budding on a tall stock.

The stock normally used is *Rosa multiflora*, which is raised from hardwood cuttings in late autumn. In the preparation of the cuttings all buds which would be buried are cut off and to assure their complete removal a thin piece of wood is removed with each bud. On bush rose stock the two top buds only are left intact. This is to prevent growth of suckers in later years.

Budding takes place the following summer, in January or February, at



Budding. A—T-shaped cut made on stock (left) and corners of cut loosened for insertion of bud (right). B—Bud inserted (left) and wrapped with raffia (right).

a time when the bark will lift or separate readily from the underlying wood.

The operation should be done quickly to prevent the exposed surfaces of inner tissues drying, and these tissues should never be touched with the fingers.

The buds should be selected from new season's wood which should be developed, but still dormant. The leaf blades should be cut off, but a small piece of the leaf stalk or petiole left and used for handling the bud.

When a bud is being prepared it is cut off with a very thin sliver of wood. For bush roses the stock is prepared by making a shallow T cut as low down on the stock as possible and just through the bark. The triangular pieces of bark are lifted gently and the bud slid in from the top and the excess upper portion cut off afterward. The bud should now fit firmly and a tie is applied to hold it in position and prevent it from drying out. Various materials are now used for tying, but good raffia is probably the most suitable for the amateur.

Within 2 to 3 weeks the tissues should have united and the tie must be loosened to prevent strangulation of the plant; this is best done with a sharp knife on the side opposite the bud, but the loose raffia should be left, as it will still give some protection to the bud.

The bud will usually remain dormant until the following spring. If, however, it breaks before winter, the stock should be cut off above the bud; otherwise this should not be done until the following spring.

The operation of budding is illustrated on page 622.

Special Points

A seed-bed is often prepared in the colder part of the year, the seed sown, and then a glass cover provided. When that is done little benefit is derived from the glass for a couple of weeks, which is the period required for warming soil under glass. This should be done before the seed is sown.

Fresh seed is always best. If seed is left over, it should be kept in tins or jars in a dry, cool place.

Expensive seed is generally economical because of the better strain and germination.

Seed dressings will assist in the prevention of "damping off" of young seedlings and are well worth using. Thiram-based materials are safe to use on flower garden seed. A pinch is enough for a packet of seed and is best applied by shaking the seed with the dressing in a small jar.

Material for propagation should not be selected haphazardly. The best possible plants in regard to growth and flowering should be used and best results are always obtained from vigorous growth on young plants.

Young seedlings or freshly rooted cuttings should not be exposed to full sunlight in summer; adequate shade should be provided.

Before all plants which have been growing under glass are transplanted they should be gradually hardened off to be able to withstand the shift.

A special nursery plot is preferable to having odd patches here and there in the garden.

Various hormones are available which will assist in the propagation of plants. Root-forming hormones are of definite value, but their use is no excuse for relaxing in the attention that should be given to the plants, and they should always be used according to the manufacturer's direction.

Garden Work for January

After a few weeks of hot, sunny weather those gardens which were planned to give the best display over the holiday period will begin to look untidy if maintenance is not kept up. Hoeing to keep down the weeds and the removal of spent flowers and dead annuals will improve the appearance of the garden considerably.

Watering is necessary at this time of the year to keep the plants fresh and to ensure a continuous supply of flowers. It is better to water in the evening rather than in the heat of the day, as there is less loss from evaporation and the water remains in the soil for a longer time. Spraying for such pests as aphids, thrips, and red spider should be continued with the materials recommended in last month's notes.

Those gardeners who have been away on holiday will want to get the garden back into order and planted up for a late summer display as soon as possible. January is not too late to plant out such subjects as French and African marigolds, dwarf salvia, portulaca, petunia, annual phlox, and, in the colder districts, calendula and stock. The ground should be well watered before planting. If possible, it should have a good soaking the evening before the plants are put out. Sturdy, well-grown plants are preferable to weak, spindly ones that have been grown too quickly and have not had time to harden off.

Bulbs

Spring-flowering bulbs that were not lifted or transplanted last month should be lifted early in January and this is also the time to think of further plantings of bulbs in the garden. February and March are the usual months for planting out new ones, and all supplies should be ordered early to ensure that the numbers and varieties required at the desired time are received. Autumn crocus, nerines, and lachenalia, which flower in the autumn or winter, can be planted out in January.

The ground for planting should be prepared well in advance, especially if it is intended to incorporate organic fertilisers with the soil. Bulbs do best in a soil that contains plenty of organic material, but this must be well decomposed before the bulbs are planted. As an alternative to the digging in of organic material bonedust can be used safely at rates of up to 4oz. to the square yard.

Rock Gardens

At this time of the year the removal of spent flowers before seeds mature is important. Otherwise those plants that grow readily from seed will later overrun the garden. Very vigorous plants should if necessary be cut back to prevent their smothering weaker-growing ones.

Rock gardens should always be kept weeded, because if weeds are allowed to grow, they will cover some of the smaller plants and detract from the beauty of the garden.

Bulbs for the rock garden may also be ordered at the beginning of the year and there are many varieties to give colour in late winter and early spring such as crocus, *Cyclamen neapolitanum* (winter flowering), muscari (grape hyacinths), lachenalia, and, in colder districts, galanthus species (snowdrops).

Carnations

Carnations can still be layered by use of the method described in last month's notes, and layered plants should be watered regularly. The development of roots on the young plants will be delayed if the soil round the parent plants is allowed to dry out. Perpetual flowering carnations may be increased by cuttings taken in January.

Plants that are growing strongly and are carrying good flowers should be chosen as parent material. Side shoots about 4in. or 5in. long taken from old flowering stems are the best material to use. The lower leaves should be cut off and the cuttings inserted in sandy soil either in a covered frame or, when only three or four have been taken, under a preserving jar. The cuttings should be protected from full sunlight until roots are well established.

Seed Sowing

Perennials sown in January should be large enough to plant out before winter, but where autumn starts fairly early in the year and brings frosts some form of protection for the young plants may be necessary. The seeds of bedding plants for winter and spring display may also be sown this

[*Green and Hahn*

Rock gardens should be kept weeded to allow their full beauty to be appreciated.

month. Where they are not likely to be damaged by frosts anemone and ranunculus also may be planted in rows for a winter display.

Antirrhinum, stock, wallflower, and calendula can be sown in the south, but in warmer districts iceland poppy, cineraria, sweet william, pansy, viola, *Primula malacoides*, and carnation also may be sown.

Gladiolus

In many gardens January is the main flowering month for gladiolus. When the spikes are being cut for use indoors as much foliage as possible should be left so that the maximum amount of plant food will be returned to the corms and help them to produce better blooms in the next season. As gladiolus sets seed freely, all spent flowers should be removed, unless either for planned hybridisation or for interest it is desired to grow seedlings and get new colours that way.

Because the plants are flowering or in some cases have finished, a number of gardeners regard further spraying as unnecessary. Thrips can still build up large populations, however, and DDT or lindane emulsion sprays should be applied. Apart from the fact that thrips can be carried over on the corms until the following season their presence on the leaves is a source of infestation to other plants in the garden.

Roses

One of the ways in which roses are propagated is by budding and for the enthusiast who has the stock available it is a fascinating process. Budding is carried out when the bark lifts freely, usually in January and early February, and the new bushes will flower in the following season.

The rambler varieties of roses, such as Hiawatha, have only one crop of flowers in the season. Instead of the pruning being left until winter they should be pruned as soon as they have finished flowering. This pruning consists of cutting out as many of the old canes as possible to ground level. Besides directing all the plant's energies into the new canes, and resulting in a good crop of roses the next season, this practice eliminates a source of mildew to which rambler roses in particular are very susceptible. It also increases air circulation and reduces the amount of disease on the new growth. As rose blooms do not keep for long during summer, they should be picked while the buds are still fairly tight. If they are put in containers of water up to their necks for 2 to 3 hours in a cool, dark place, they will last for much longer.

Cuttings

Many shrubs can be increased by cuttings of semi-mature wood of the current season's growth taken in January. Small side shoots on the main branches are usually the best, provided that the wood has hardened slightly. Soft, succulent tips of the growths should not be used. To prevent the cuttings from wilting they should be covered with a sheet of glass and a frame can be made easily by using an ordinary seed box from which the bottom boards have been removed. Either pure sand or a mixture of sand, loam, and leafmould in equal proportions can be used for rooting the cuttings, provided that there is good drainage. Where sand alone is used the cuttings will have to be removed and planted in soil as soon as they have rooted, as there is very little food value in sand to maintain growing plants. Shrubs such as buddleias, mock orange, hydrangeas, lavender, *Azalea indica*, *Lonicera nitida*, and fuchsias may be propagated from cuttings now.

Lawns

Grass-grub and subterranean caterpillar will probably become troublesome in some established lawns during January and February. They can be controlled by the use of 50 per cent. DDT applied at 1oz. to 40 sq. yds. This may be mixed with dry soil or sand to give a more even distribution over the area. One application will keep the lawns free of these pests for 2 to 3 years.

March is the best month for sowing new lawns. The soil must be consolidated, so if a lawn is to be put down it is not too early to start work on the area. Levelling and firming are of major importance and, in addition, light hoeing should be done to kill young weed seedlings, thereby minimising the amount of trouble from weeds smothering the young grass plants later.

Chrysanthemums

One of the main diseases that attacks chrysanthemums over summer is rust. Unless it is kept in check by regular spraying, the flowers and foliage from diseased plants will be very disappointing. To control rust the best spray is lime sulphur, 3½ fl. oz., and colloidal sulphur, 1½oz. (weight), to 4 gallons of water.

Cooking with Dried Fruit

FRESH and frozen fruits have increased greatly in popularity in recent years, but this has had little effect on the demand for dried fruits, which, though they are not identical in flavour and texture with their fresh, frozen, or bottled counterparts, bring pleasing variety to meals at a time when fresh fruit is scarce. Also there are the vine fruits currants, raisins, and sultanas, which are used always in their dried forms for cakes, pickles, chutneys, and sauces, for which their texture and concentration of flavour and sweetness are ideal. In this article Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin, has collected recipes using dried fruit alone or combined with fresh fruit, but which depend for their success on the special factors contributed by the dried fruit.

Fruit mince pie is excellent picnic fare. It has a fruity flavour, is easy to pack, and carries well.

DRYING is one of the oldest, simplest, and cheapest methods of preserving fruits. The principle of sun drying is believed to have been known to the very early Egyptians, who found that mature grapes left hanging on the vines in bright sunshine lost most of their moisture and gained in sweetness. They found, also, that this sun-dried fruit had outstanding keeping qualities. From this early discovery has developed the dried fruit industry of today.

Special Advantages

Some fruits are grown specifically for drying and only high-quality tree- or vine-ripened fruit is suitable. Dried fruits are popular because they do not require as expensive storage as fresh fruit, they may be kept for long periods, they occupy much less space than tinned or bottled fruit, they are palatable and satisfying, and they are available throughout the year. Also they contribute, with the possible exception of vitamins, every factor found in fresh fruit, and the prolonged ripening allows the flavour and sugar content to become fully developed.

Dehydration

Fruits may be dried in the sun or artificially as in a forced draught of heated air. The latter method is known as dehydration and has enlarged the field of dried products to include more kinds of vegetables and fruits than was possible with sun drying. Also the process is completed in hours whereas sun drying may take 10 days.

Home drying of fruits can be done successfully in the sun, in a cool oven, or in a specially constructed drier, but consideration of home drying is beyond the scope of this article.

Fruits Suitable for Drying

Among the dried tree fruits are apricots, peaches, nectarines, prunes, pears, figs, and dates. Dried apples, though more prone to discoloration than most other fruits, are a good substitute for fresh apples during the comparatively short time when fresh apples are unobtainable. Most of these fruits are used in the dried form only when the fresh fruit is not available, except where dried fruit's special attributes make it more suitable. On the other hand vine fruits—currants, raisins, sultanas, and muscatels—are used dried all the year round. Fresh vine fruits are used for purposes quite different from those of the dried fruits.

Food Value

Fresh fruit is important in the diet because of its vitamin C and mineral content. In the drying process vitamin C is largely destroyed, but the mineral matter remains. The amount of calcium in figs, dates, and raisins is sufficient to warrant consideration, and prunes, figs, and dates are good sources of iron. Dried figs, raisins, and dates contain 60 to 75 per cent. of carbohydrate, mostly as sugar, and should be avoided by those who are overweight. Prunes and figs both have a mild laxative effect.

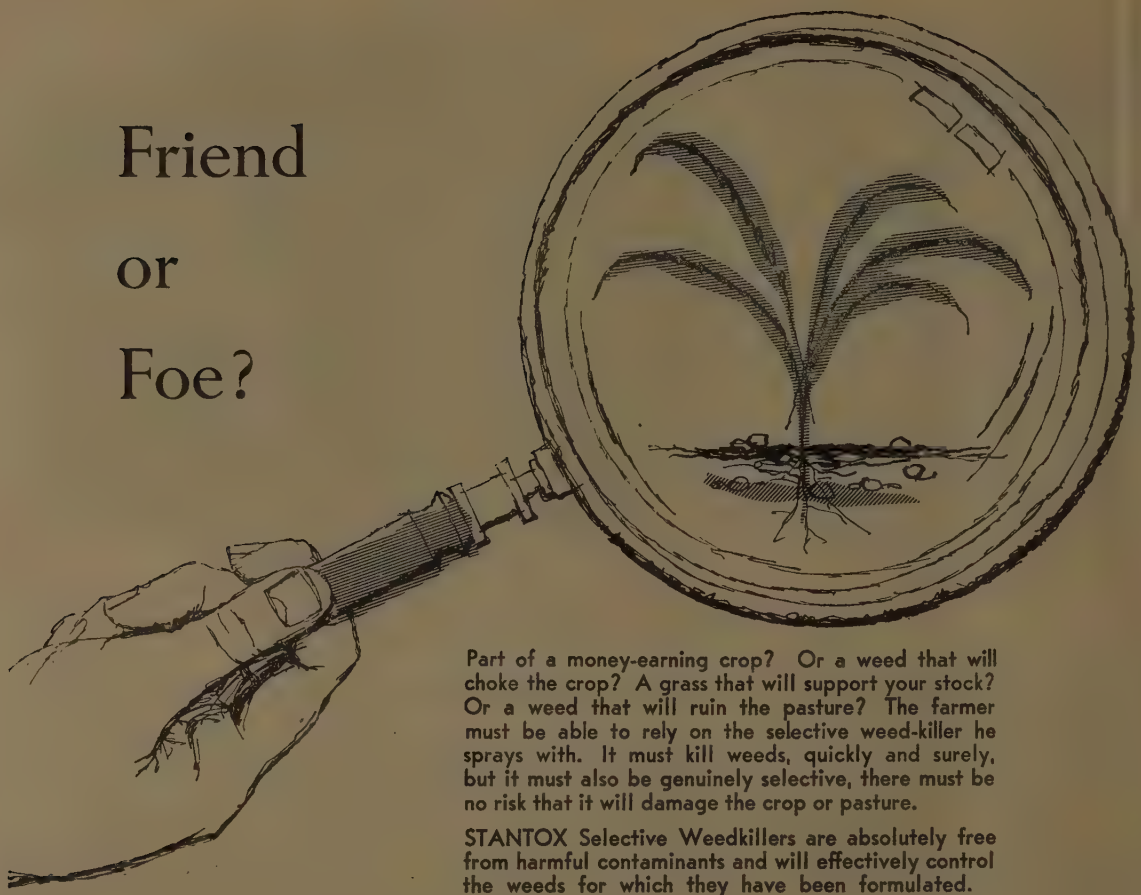
Preparation

The preparation of dried fruit requires three steps, washing, soaking, and cooking. Thorough washing is desirable for all dried fruit to remove dust and grit which may have been blown on to it while it was exposed to the sun, and is particularly necessary for unpackaged fruit that may have been exposed to dust in the air and even to insects. Soaking the firmer fruits such as apricots, peaches, and prunes restores moisture and the fruits become plump and somewhat tender and require less cooking. Softer fruits such as raisins, dates, and dessert figs do not require soaking.

The fruit should be cooked in the water in which it was soaked. Add the sugar for only the last 5 minutes of cooking, except with figs, for which it should be added for the last 15 minutes. The softened fruit should be boiled gently in a covered saucepan until it is soft. No definite cooking time can be given, because some fruits —apricots, for example—will start to break up after only 2 or 3 minutes' cooking, but prunes may take 15 to 20 minutes. If apricots are very soft after soaking, the syrup should be made first and the fruit placed in the syrup, which should be brought back to boiling point, boiled gently for only a minute, removed from the heat, and allowed to cool in the saucepan with the lid on.

Figs require slightly different treatment. Stewing at a brisk boil is the approved method of cooking dried figs. Quick cooking without preliminary soaking is thought to give the best

Friend or Foe?



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flavour, texture, and appearance. Boil briskly with the lid on the pan for 20 to 30 minutes, adding sugar for the last 15 minutes of cooking. Orange or lemon slices or a few cloves added to the cooking water give variety of flavour.

The longer ripening time of fruit for drying allows the sugar content to develop fully, making dried fruit sweeter than fresh fruit; consequently only a small amount of sugar is required in cooking, about ¼ cup (2oz.) to each pound of fruit.

The addition of lemon, orange, or grapefruit juice to the cooked dried fruit just before serving will give a fresh fruit flavour and provide some vitamin C.

All fruit will become plumper and the cooking water will develop more flavour if they stand for an hour or two after cooking. Fruit that has been tenderised has been pre-cooked and does not require as long a cooking time.

Recipes

All measurements in the recipes given are level. Standard measuring cups (8 fl. oz.) and standard measuring spoons are used.

All dried fruits should be thoroughly washed.

Desserts

The following five recipes are suitable for any dried tree fruit such as peaches, apricots, and prunes.

[*Photo News*

▲ Prune upside-down pudding as it comes from the oven . . .

▼ . . . and as it appears when ready for serving.

[*Photo News*

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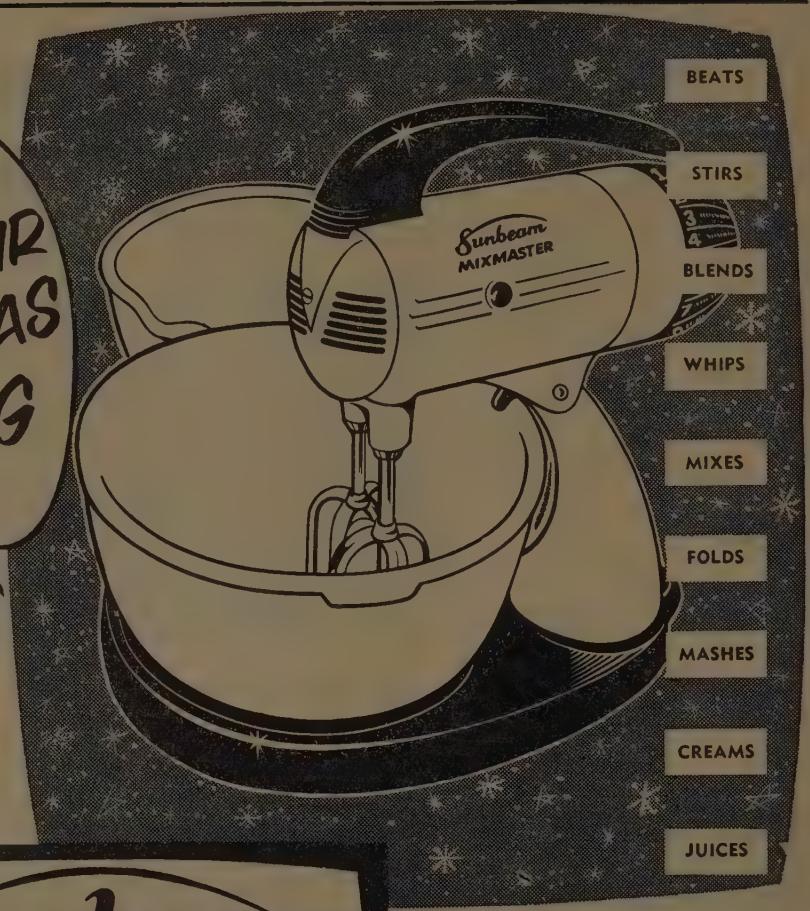

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Fruit Fluff

2 cups of cooked fruit
½ cup of castor sugar
½ pint of whipped cream
1 cup of coconut

(Serves 6)

Pass the cooked fruit through a sieve. Add the sugar and ½ of the coconut. Whip the cream until thick. Whip the fruit mixture into the cream a little at a time. Chill thoroughly, but do not freeze. Sprinkle the remainder of the coconut on top before serving.

The coconut may be omitted and crystallised cherries used for the garnishing.

Fruit Jelly

2 cups of fruit juice
½ cup of sugar
4 teaspoons of gelatine
3 tablespoons of lemon juice
3 tablespoons of cold water

(Serves 4)

Combine the fruit juice, sugar, and lemon juice and heat to boiling point. Moisten the gelatine in the cold water, add the hot liquid to it, and stir the mixture until it has dissolved. Pour into a mould to set. Serve with whipped cream.

Fruit Whip

4 teaspoons of gelatine
½ cup of water
¾ cup of fruit juice
1 cup of fruit pulp
2 egg whites
2oz. of sugar
1 tablespoon of lemon juice

(Serves 4)

Moisten the gelatine with the water. Add the sugar. Heat the fruit juice to boiling point and pour it over the gelatine mixture, stirring until the gelatine and sugar are dissolved. Add the fruit pulp and leave the liquid until it is on the point of setting; then add the lemon juice and beat the mixture until it is thick and fluffy. Fold in the stiffly beaten egg whites and pile the whip into a bowl. Serve with a custard made with the egg yolks, ½ pint of milk, and 1oz. of sugar heated together in the top of a double boiler until the custard coats the back of a wooden stirring spoon.

Fruit Charlotte

2 or 3 slices of buttered bread
1 teaspoon of ground cinnamon
2 cups of cooked, chopped fruit
⅓ cup of sugar
¾ cup of fruit juice

(Serves 4)

Butter a pie-dish. On the bottom place a layer of the cooked, chopped fruit; over this put a layer of the buttered bread cut into small cubes. Sprinkle over this some of the sugar mixed with the cinnamon. Place another layer of fruit on top and continue in this way until the pie-dish is full. Pour the fruit juice over and on top put a final layer of buttered bread or breadcrumbs dotted with butter. Bake in a moderate oven (350 degrees F.) until the pudding is heated through and the top is browned.

Upside-down Cake

Cooked dried fruit
2 tablespoons of brown sugar
1 teaspoon of lemon juice
1 teaspoon of butter
4oz. of flour
4oz. of sugar
1 teaspoon of baking powder
2oz. of butter
1 well-beaten egg
½ teaspoon of vanilla
½ cup of milk
¼ teaspoon of salt

(Serves 4)

Butter liberally the bottom of a baking tin. Arrange a layer of cooked fruit—pitted prunes, apricot halves, half peaches, or a combination of any of these—on the bottom and sprinkle with the brown sugar and lemon juice and dot with 1 teaspoon of butter.

Cream the 2oz. of butter, add the sugar, and continue creaming until the mixture is fluffy. Add the vanilla and well-beaten egg. Mix in the sifted dry ingredients alternately with the milk and pour this batter over the top of the fruit in the baking dish. Bake in a moderate oven (350 degrees F.) for about 1 hour. Run a knife round the edges of the cake and then turn the cake on to a serving dish. The fruit will then be on top.

Raisin Recipes

Baked Raisin Puff

4oz. of sugar
4oz. of butter
2 eggs
¼ teaspoon of salt
1 cup of milk
1 teaspoon of vanilla
4 teaspoons of baking powder
12oz. of flour
½ packet of raisins

Cream the butter and sugar. Add the beaten eggs and beat them in well. Sift the dry ingredients and add them alternately with the milk. Add the raisins. Bake the mixture in a buttered baking dish in a moderate oven (350 degrees F.) for 1 hour. Serve with lemon sauce.

Lemon Sauce

1 cup of boiling water
1 tablespoon of cornflour
½oz. of butter
4oz. of sugar
4 tablespoons of lemon juice
½ teaspoon of grated lemon rind

Mix the cornflour and sugar with sufficient cold water to make a thin cream. Stir this into the boiling water and allow to cook slowly for 3 to 5 minutes, stirring continuously. Add the butter, lemon rind, and juice.

Raisin Pie

2 cups of seedless raisins
1 small tin of crushed pineapple
Juice of 1 lemon
8oz. of brown sugar
1 tablespoon of cornflour

Wash the raisins, put them in a saucepan with sufficient water to cover them, and boil them gently for a few minutes. Add the sugar and stir until it has dissolved. Mix the cornflour smoothly with the juice from the pineapple. Add this to the hot mixture and boil gently for 5 minutes. Add the crushed pineapple and lemon juice and cook for 2 to 3 minutes longer. Line a pie plate with short pastry. Fill this with the mixture, and cover with pastry. Seal the edges and make a cut in the top. Bake in a hot oven (400 to 450 degrees F.) until the pastry is cooked (15 to 20 minutes).

Raisin Meringue Pudding

2 egg yolks
2 tablespoons of sugar
¼ teaspoon of salt
2 cups of scalded milk
1 cup of soft breadcrumbs
½ teaspoon of vanilla
¼ cup of raisins

Meringue

2 egg whites
⅛ teaspoon of salt
2 tablespoons of sugar

Beat together the egg yolks, sugar, and salt. Add the milk, breadcrumbs, raisins, and vanilla. Turn the mixture into a baking dish and cook in a pan of hot water in a moderate oven (350 degrees F.) until set (about 45 to 60 minutes). Beat the egg whites until foamy, add salt and half the sugar and beat again, then beat in the remaining sugar. Pile the meringue on top of the pudding and cook in a moderately hot oven (375 degrees F.) until lightly browned (about 10 minutes).

Raisin Sauce

6oz. of brown sugar
1oz. of cornflour
1½ cups of liquid in which ham or tongue was cooked
¼ cup of vinegar
½ cup of raisins
1 thinly sliced lemon
1 tablespoon of butter

Mix the cornflour and sugar in the upper part of a double boiler and add the liquid from the meat gradually, stirring constantly. Add the remaining ingredients and cook until the raisins are plump and the mixture has thickened. Serve hot with ham or tongue.

Fruit Mincemeat

½lb. of suet
½lb. of raisins
½lb. of currants
½lb. of sultanas
½lb. of peeled and cored apples
¼lb. of mixed peel
½lb. of brown sugar
Juice of 1 lemon
1oz. of Jordan almonds
¼ teaspoon of mixed spice
¼ teaspoon of ground cinnamon
¼ teaspoon of ground nutmeg
½ gill of brandy

Put the apples, raisins, currants, sultanas, mixed peel, and almonds (blanched) through the mincer. Mix the sugar, suet, and lemon juice in a bowl and add the mixed ingredients. Add the brandy and stir it thoroughly through the mixture. Store in jars in a cool place. The flavour is mellower if the mincemeat stands a few days before use.

Date Recipes

Dates can be used for stuffing baked apples, for steamed puddings, date loaf, date scones, and filling for shortcake, and stuffed with coloured fondant they make attractive party sweets.

Date Loaf

1 cup of stoned and chopped dates
1 cup of boiling water
1 tablespoon of butter
2 cups of sifted flour
3 teaspoons of baking powder
½ teaspoon of salt
¾ cup of sugar
1 egg
1 cup of chopped walnuts (optional)

Put the dates and butter into a basin, pour the boiling water over them, and let stand until almost cold. Sift the flour, baking powder, and salt together. Beat the sugar and egg together and add them to the date mixture alternately with the dry ingredients. Lastly add the chopped walnuts. Pour the mixture into a greased loaf tin and let stand for 20 minutes. Bake in a covered tin in a slow oven (350 degrees F.) for 1½ hours. Turn on to a cake rack to cool.

Date Filling

1lb. of dates
1 tablespoon of lemon juice
½ cup of water
1oz. of butter

Put the dates, water, and butter in a saucepan and heat them gently, stirring all the time until a mixture of spreading consistency is formed. Add the lemon juice. Cool and use as required.

Fig Recipes

Fig Loaf

2½ cups of sifted flour
4 teaspoons of baking powder
½ teaspoon of salt
½ cup of sugar
1¼ cups of chopped figs
2 eggs
1¼ cups of milk
¼ cup of melted butter

Sift the flour with the baking powder, salt, and sugar. Add the figs. Beat the eggs and add the milk and melted butter. Add these to the dry ingredients, stirring only enough to dampen all the flour. Pour into a greased loaf pan and bake in a moderate oven (350 degrees F.) for 1 hour.

Fig Filling

1 cup of dried figs
4 tablespoons of sugar
1 cup of hot water
1 tablespoon of lemon juice

Wash the figs and cover them with boiling water and let them stand for 30 minutes. Drain them, snip off the stems, and cut up the figs finely. Add the hot water and sugar and cook gently, stirring constantly until the mixture has the consistency of jam. Stir in the lemon juice and cool. This makes 2 cups of filling.

Miscellaneous Recipes

California Stuffing for Turkey

1½ cups of cooked prunes
1½ cups of dried apricots
1½ cups of dried peaches
1½ cups of seeded raisins
6 cups of stale breadcrumbs
¾ teaspoon of salt
1 teaspoon of sage
½ teaspoon of thyme
½ cup of melted butter
Stock to mix

Stone the prunes and cut them into small pieces. Wash the apricots and peaches and boil with 1 cup of water for 15 minutes. Drain and cool. Wash the raisins. Combine all the fruits. Mix the breadcrumbs with the salt, sage, thyme, and melted butter. Add the fruits and sufficient stock to moisten the crumbs, mixing lightly. This makes sufficient stuffing for a 15lb. turkey.

Dried Fruit and Bacon Savouries

½lb. of seeded raisins
½lb. of sultanas
1lb. of thin rib rashers of bacon

Cut off the bacon rind. Put the fruit through a mincer. Form the mince into rolls and wrap a convenient-sized piece of bacon round each roll and secure the rolls with a tooth pick. Put the rolls on a skewer and grill them until the bacon is cooked, or cook them in a hot oven for 10 minutes. Serve hot.

The filling may be replaced by prunes. Wrap the bacon round prunes that have been soaked, stoned, and drained free of liquid.

Dried Apricot Jam

1lb. of dried apricots
2 lemons
3lb. of sugar
3 pints of boiling water

Wash the fruit and soak it overnight in the water. Put the fruit mixture into a greased preserving pan, add the grated rind and juice of the lemons, and bring to the boil. Cook until the fruit is tender (½ hour). Add the warmed sugar and allow it to dissolve. Bring the jam to boiling point and boil hard until it gives the setting test. Pot, cover, and label the jam.

Dried Fig and Rhubarb Jam

1lb. of figs
1 pint of water
4lb. of sugar
4 lemons
4lb. of rhubarb

Cut the figs into pieces. Squeeze the juice from the lemons and mince the rind and pith. Boil these until soft in the water. Chop the rhubarb into ½in. pieces and add it to the fig and lemon mixture. Bring to the boil and add the warmed sugar. Boil hard until the jam gives the setting test. Pot, cover, and label the jam.

Dried Apricot, Pineapple, and Orange Jam

1lb. of dried apricots
3oz. of blanched almonds
1 tablespoon of lemon juice
1½ pints of water
1 small tin of crushed pineapple
1lb. of oranges (peeled and cut into thin slices)

Rinse the fruit and soak it for 24 to 48 hours in the water. Place the apricots, the water they were soaked in, and the sliced oranges in a pan and boil gently for 30 to 40 minutes, stirring occasionally. Add the pineapple, measure the ingredients, and add an equal quantity, cup for cup, of sugar. Boil rapidly and stir to prevent the jam from burning until it gives the setting test. Pour the jam into hot, sterilised jars and cover it.

Banana and Date Chutney

1lb. of chopped mild onions
½lb. of chopped dates
6 peeled bananas
1 cup of fruit juice (syrup from apricots, peaches, or pears)
½lb. of chopped raisins
1 cup of malt vinegar
½lb. of minced crystallised ginger
1 teaspoon of salt
1 teaspoon of curry powder

Place the onions and dates in a saucepan. Mash the bananas and add them with the vinegar to the onions and dates. Cook until boiling, stirring frequently, then simmer gently for 20 minutes. Add the remainder of the ingredients, using the syrup from apricots, peaches, or pears bottled in syrup. Stir until boiling, then simmer, stirring frequently until thick. Pot and seal like bottled fruit. This mixture yields 2 quarts.

Dried Fruit Chutney

½lb. of dried apples
½lb. of dried peaches
½lb. of dried apricots
½lb. of stoned dates
½lb. of seedless raisins
½lb. of onions
1lb. of sugar
1 tablespoon of mixed spices
1 tablespoon of salt
½ teaspoon of cayenne pepper
2 cups of vinegar

Wash the dried fruit and soak it in water overnight. Drain off the water, cut the fruit in pieces, and stew it in some of the soaking water until it is soft. Mince the dates and raisins, chop the onions, and add these with the other ingredients to the fruit and cook for ½ hour longer, when the chutney should be thick and soft. Stir frequently, as the mixture is apt to stick to the bottom of the pan and burn. Bottle hot and cover lightly.

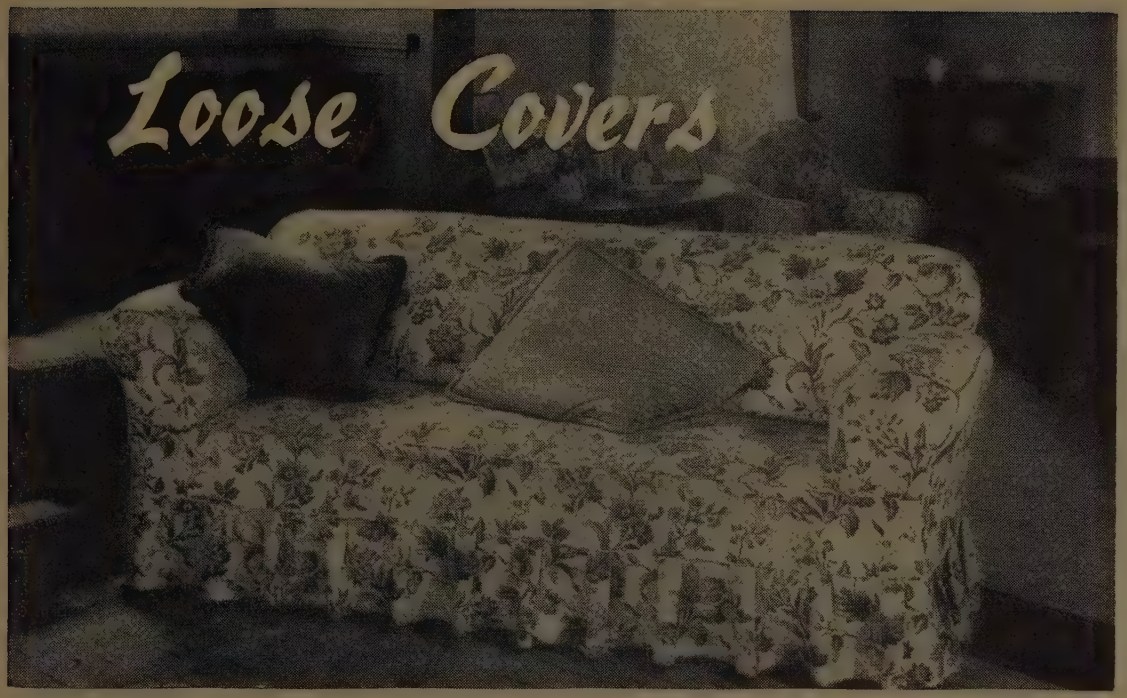
Washing Hair Brushes and Clothes Brushes

THE backs and handles of hair and clothes brushes may be made of any one of a variety of materials which are adversely affected by hot water. If brushes are washed in the following manner, there is no need for these parts to come in contact with the hot water.

Comb the brush to remove hairs. Hold it by the back in the right hand and dip the bristles up and down smartly in very hot, soapy water. Continue until the bristles are clean. Still holding the brush by the back, draw it over a piece of clean linen to wipe the bristles. Rinse it in clean, warm water, first by dipping the bristles up and down as before, then by holding them under the tap. Finish off by immersing the bristles for a few minutes in cold water to which a few drops of ammonia have been added. Dry the brush by shaking it face downward; then lean it on the window ledge in the sun to dry, bristles uppermost.

Brushes should be washed frequently before they become really soiled. Washed in this way, they should retain their resilience for years.

—*MAUD B. STRAIN,*
Field Officer in Rural Sociology,
Department of Agriculture,
Dunedin



By EVELYN E. MOORE,
formerly Field Officer in Rural Sociology, Department of Agriculture, Palmerston North

LOOSE covers, as the name implies, were designed originally merely for protecting valuable furniture. They were loose and sloppy and frequently detracted from, rather than added to, the pleasant appearance of a room. However, their possibilities were eventually realised and they are now considered as very much a part of the decorating scheme in many homes—whether they are being used to protect beautifully upholstered new furniture, to give chairs with old and worn covers a new lease of life, or to modernise and conceal the bad proportions in otherwise good furniture. In addition they may be removed when necessary for washing or dry cleaning, and are therefore more useful than tight upholstery covers, the shampooing of which is apt to be a long, tedious job for the housewife who undertakes it herself, with a result which may not be as effective as she had hoped.

WHETHER the housewife who has decided on loose covers will choose to make them herself or pay to have them made professionally is, however, another matter. They are not difficult to make, if the home sewer has average skill in dressmaking and, perhaps of more importance, enjoys sewing. However, the work and time involved are considerable and it may not be wise to start making covers—especially covers for a suite of furniture—unless they can be finished within a reasonable time. Nothing is more depressing to the would-be cover maker than to have half-finished covers lying about for weeks while she tries to fit in an odd hour here and there to complete them.

Methods of making the conventional one-piece loose cover are described in many books and booklets on sewing. This article describes briefly the choice of materials and method of making covers and discusses in more detail some short cuts that may aid in saving time and energy in the making of a loose cover at home.

The conventional type of loose cover is assembled as a whole—like a one-piece dress. It is possible, however, to make it up in separate parts—like a blouse and skirt, for example, except that it has five, not two, parts. There are advantages and disadvantages with each type. The one-part cover is easier to put on and take off a chair or couch, but as the final stages are reached in making it it becomes very awkward and bulky to handle, especially if it is being made to cover a couch, and the work becomes in consequence very tiring.

The five-part cover is easier to make and easier to repair. Also, once it is on the chair it stays in place better and looks just as neat and smart, but it does take considerably more time to put on and remove from the chair. If heavy soiling and frequent washing are not likely to be a problem, it may well be the most useful; otherwise a one-piece cover may be the most convenient.

Heading photograph by Sparrow.

Choice of Material

It is most important to choose a firm, closely woven, good-quality fabric, preferably colour-fast and easily washable. Good-quality furnishing linens have been and continue to be popular, but heavy cretonnes, rep, drill, twill cottons, some of the tightly woven, better-quality tapestries, damask weaves, and novelty weave fabrics can all be used provided they are of suitable weight and are not too heavy to be sewn, darted, and fitted easily. Plain materials, stripes, checks, and all-over floral patterns are easier to use and fit than the large rosette or picture type of design.

If soiling may be a problem, patterned materials with dark colours for the background should be chosen. Plain, light-coloured materials are especially apt to show even light traces of soiling and spots and stains. Covers which do not show soiling need not be dull, as there are available a variety

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of linens, cretonnes, and other fabrics with bright, cheerful colours on dark, stain-concealing backgrounds.

Material Required

Armchairs and couches are the furniture for which loose covers are most often needed, but fireside chairs, bedroom chairs, divans, and many other pieces of furniture may also be covered, to help co-ordinate the colour scheme in a room which otherwise might appear haphazardly furnished.

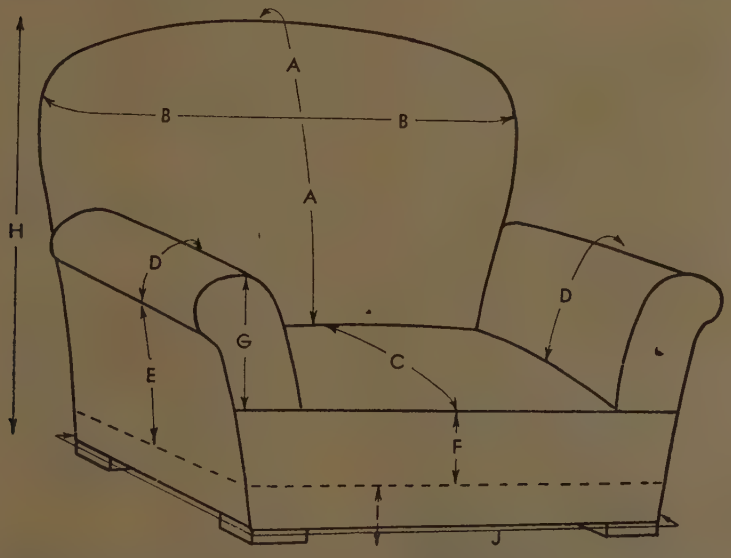
Because furniture may vary greatly in size and shape, it is not possible to give the exact amount of material required or exact directions suitable for covering all types of chairs or couches. The directions given are, therefore, modified for the chair illustrated, though the same general rules apply to all.

To estimate the material required the furniture to be covered should first be measured carefully (see diagram below), and the amount required calculated from these measurements.

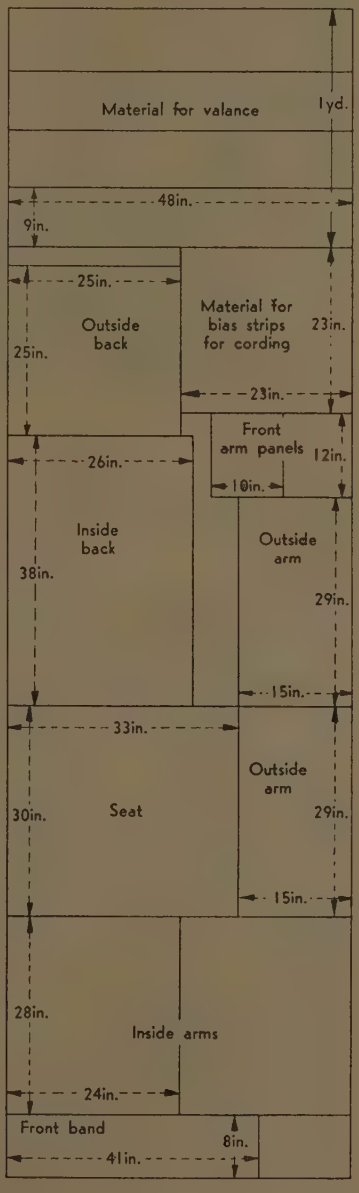
If 30in. material is to be used and the chair is of average size with measurement B not more than 33in. or 34in., an accurate estimate can be obtained by adding measurements A, C, D, E, F, and H together and adding on 2yds. to 3yds. for the valance or skirt and piping needed for the seams.

The amount needed for the valance can be estimated from measurements I and J, allowance being made for any pleating or frilling.

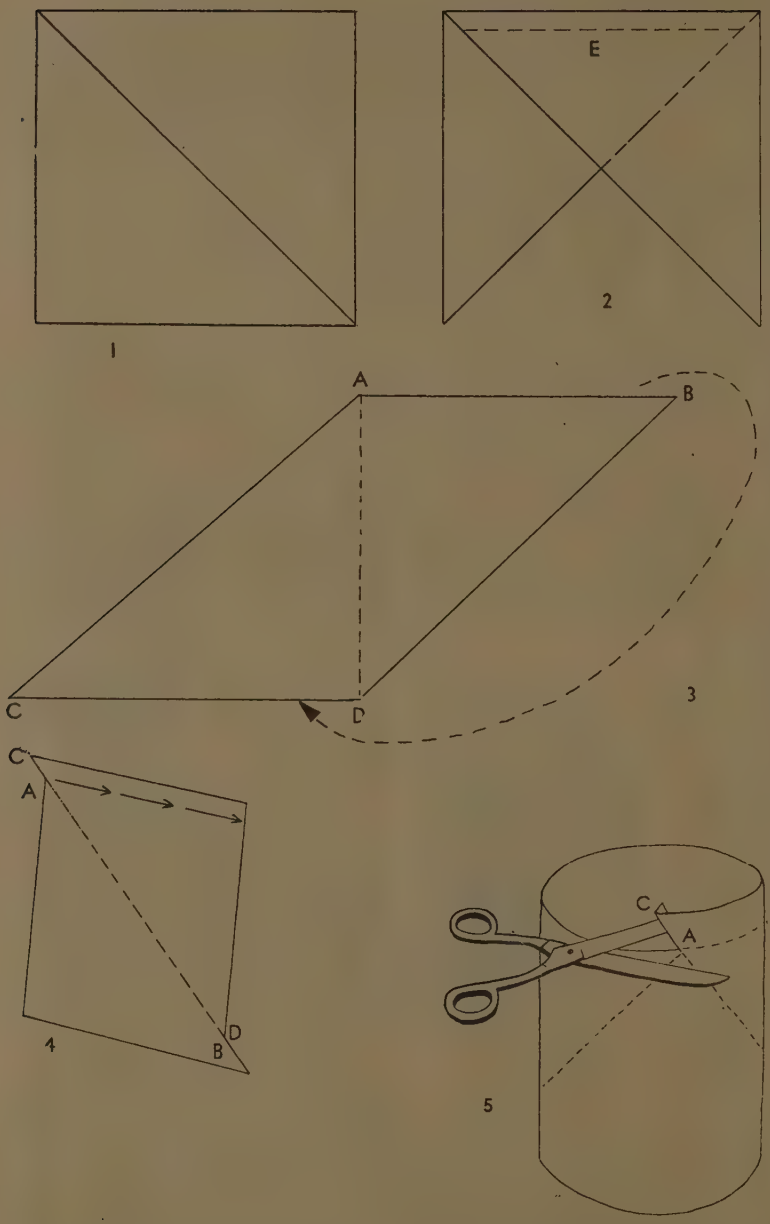
If the chair is very large or if 48in. material is to be used, it will probably be advisable to draw to scale squares representing each section of the chair on a large piece of paper on which a strip equivalent to 48in. has been marked out (see diagram below), on which measurements have been calculated for the chair illustrated. This chair, which is of average size, requires 5yds. of 48in. material, or about 8yds. of 30in. material to cover it. Couch covers require up to twice as much material.



Where to take measurements. A—Length of inside back from over top roll to seat. B—Width of inside back (to check measurement against width of material). C—Depth of seat. D—Length of inside arm from over arm roll to seat. E—Length of outside arm from under arm roll to point where valance joins. F—Depth of front band. G—Length of front arm panel. H—Length of outside back. I—Depth of valance. J—Distance all round chair (to check number of widths of material required). If no valance is required, take the measurements E, F, and H from the top edges to the base of the chair and add 6in. to 8in. for underlap to tie under the seat.



Layout of the pattern on 48in. material.



Making the bias binding. 1—The square of material cut diagonally. 2—The two short sides joined, with the peaks opposite each other. E is the line of stitching. 3—The material opened out flat, showing the line of stitching (AD). 4—The edges AB and CD (in 3) are brought together so that the material forms a cylinder and so that point C projects beyond point A by the desired width of the binding. The edges are then stitched down so that all raw edges are inside the cylinder. A continuous strip of bias binding can then be cut by starting at A and cutting in the direction of the arrows as shown by the scissors in 5.

Cutting the Material

Using the measurements taken (as described for the bottom left diagram on page 633) to estimate the amount of material and allowing 1in. seam allowances on all edges and extra (4in. to 6in.) for tuck-ins around the seat, cut or tear rectangles for each of the main parts (two inside and outside arms, seat, two back pieces, and front band). Label the rectangles for future indentification and make any necessary notes on the arm pieces with patterns to be matched or on pieces with patterns which can be used only one way.

If the material is not wide enough, cut and machine strips on either side of the main piece to give the necessary width. There are often two left-over strips large enough for the front arm panels. These look better if they are matched as nearly as possible. Any rosette type of design should also be centred on the inside back, seat, and front band to improve the finished appearance of the chair. After the depth of the valance and the amount of pleating or frilling has been decided on the required number of strips the full width of the material can be cut or torn for joining up later. A 30in. square of material will make sufficient bias strips for piping to cover the average-sized armchair with rolled arms. These bias strips, which should be about 2in. wide, can be made simply and quickly (see diagram at left). The cord itself can be purchased and should be boiled and dried before it is used to allow for shrinkage, which is usually considerable.

Fitting the Cover on the Chair

The pieces can be fitted and joined in a number of ways. However, an order which has proved convenient in making the five-part cover illustrated is as follows:—

1. Make the piping.
2. Fit the inside back.
3. Fit the outside back and join it to the inside back. (See lower photograph on opposite page.)
4. Fit the inside and outside arms and insert the front arm panels.
5. Fit the seat and front seat band.
6. Make the valance or frill for round the bottom of the chair.

1. Piping

Fold the bias strip in half (right side out), insert the cord in the fold, and using a zipper or cording foot on the machine, stitch the cord in place (see diagram below).

Covering the piping cord.

2. Inside Back

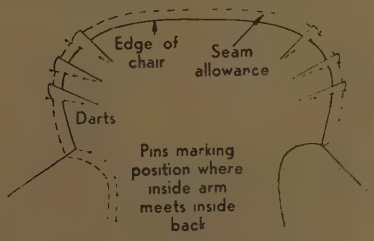
Mark the centre of the chair back with a piece of string pinned in place at the top and bottom and lay the rectangle of material (inside out) on the chair back (see illustration at right), so that the grain is straight and the material is placed squarely on the chair back. Use the marked centre back of the chair as a guide. Regulate the fullness at each top corner with evenly spaced darts. The darts on each side should match (see diagram below). Smooth the material into

Darts pinned in to regulate the fullness at the curved edge of the back.

place along the curve where the inside of the arm meets the inside of the back. Insert pins or use chalk to mark the curve accurately, and leaving a seam allowance of 1½in. to 2in., cut away surplus material (see diagram below).

Remove the material from the chair, machine and trim the darts, and return the material to the chair, right side out, to check the smoothness of the fit at the top and sides and to ensure that there is ample material for a tuck-in at the bottom.

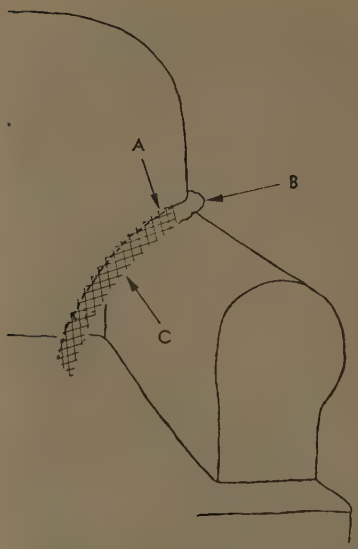
Make any necessary adjustments before going on to the next stage.



Fitting the inside back on the chair.

The rectangle of material cut for the chair back is laid in position for fitting.

Joining the inside and outside back pieces. This shows how the darts are pinned in position on the top corners of the chair. The material is removed, the darts are machined and trimmed, and the material is then returned to the chair and pinned to the outside back piece as shown.



A—Edges of bias extension turned under and machined to curved tuck-in edge of inside back. B—Raw edge of material, later hemmed down and slip-stitched to inside arm piece. C—Fold of bias extension.

3. Joining Inside and Outside Back Pieces

Lay the inside back in place on the chair (inside out) and pin the rectangle of material to be used for the outside back squarely in place, leaving a seam allowance of at least 1in. at each edge. Pin the two centre backs together, check the vertical thread of the material to ensure that it is perpendicular, and then pin the two pieces together as firmly and smoothly as possible.

Pull the cover off the chair gently—it may be necessary to unpin a section on one side if the back of the chair flares outward—trim the seam allowances, insert the piping, which should be long enough to reach completely round the sides and top of the chair back, and tack the two pieces together along the seam line. It is desirable to turn the cover right side out and return it to the chair to check the fit before machining it.

Prepare the two bias strips, about 2in. wide and 12in. to 18in. long, of a thin material such as calico (it will be tucked in out of sight when the cover is on the chair). Fold the material in half and machine it over the raw curved edge where the inside back meets the seat (see diagram above). Machine the inside back and outside back together. Start at the bottom edge and machine the piping to the seamline on the outside back, continuing up to the point where the inside and outside backs are joined.

If it is necessary, leave a space so that the cover can easily be pulled on and off the chair. Then stop, insert the inside back in the seamline, and continue round to the other side of the chair. Stop at the point where the inside back and outside back join and continue the rest of the way stitching the cording to the outside back. Use a zipper or cording foot on the machine.

Back-stitching at each end on this and all other seams will greatly strengthen the cover. Finish the bottom edges of the tuck-in and outside back with machined hems and turn under and stitch the raw edges along the part of the seamline where the inside back will eventually be covered by and slip-stitched to the inside arm pieces. The outside back should be sufficiently long to be tacked to the bottom of the chair frame and will eventually be covered by the valance.

This completes this section of the cover.

4. Fitting the Inside and Outside Arms

Take one of the rectangles to be used to cover an inside arm and smooth it in place on the chair. If a patterned material is used, check so that it will be the same way up on each arm and ensure that the lengthwise threads are perpendicular. Mark the curve where the inside arm meets the back and ensure that there is sufficient material allowed to reach right round to the back edge of the chair. If the front of the arm of the chair is curved and darts are needed to make the material fit smoothly, pin these in place. Darts should be placed toward the inside and outside edges of the arm, the top being smoothly fitted.

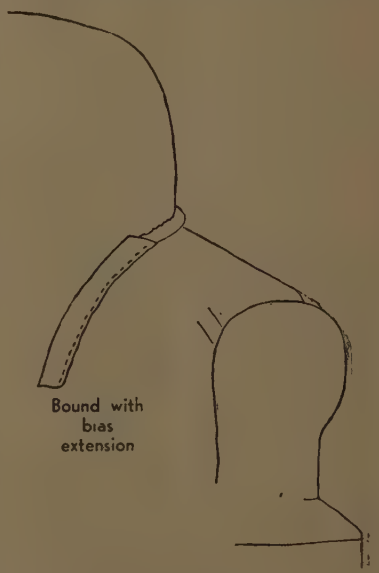
Mark the position of the seam joining the inside and outside arms. It can be piped and follow the line of the outside edge of the chair or couch (see heading illustration) or it can be carried over the edge to the point where the outside arm has been tacked down in the original upholstery (see chair illustrated on page 639).

Pin the rectangle to be used for the outside of the arm to the chair, ensuring that the lengthwise threads are perpendicular. Pin the outside and inside arms together in the desired position and, if necessary, trim the seams on all edges. The seam at the back edge of the chair may need to be shaped. When trimming the material do not forget to leave generous 1in. seam allowances.

Remove the arm pieces from the chair, stitch in place any necessary darts, insert piping cord if it is to be used, and machine the two pieces together. Bind the curved tuck-in section of the raw edge where the inside arm meets the back with a bias strip of calico. The outside section should be folded under neatly along the seamline and hemmed or machined in place (see diagram below). Finish the bottom edges of the tuck-in and the outside arm with machined hems. The outside arms should be long enough to be tacked to the wooden frame at the bottom of the chair. Return the arm piece to the chair inside out (it will be fitted on the opposite arm) and fit the front arm panel smoothly in place. In the chair illustrated this panel has a tuck-in allowance at the bottom edge of about 6in.

Chairs or couches which are straight across in front (see heading illustration) require slightly different treatment. The best method is to examine the front of the chair carefully to find how the original upholstery has been put on, and then follow the original seamlines as closely as possible. When patterned material is being used it is important to match as nearly as possible the pieces being used for the front arm panels. Pin along the seamline as firmly as possible, starting from the top centre point and working down each side to prevent the material becoming wrinkled and to keep the lengthwise thread perpendicular.

Remove the arm section from the chair, pin the piping cord in place, tack it firmly, and return the section to the chair right side out to check the fit before machining the section.



Fitting the inside arm of the chair cover. The raw edge across the top and outside of the arm is turned under, stitched, and later slip-stitched to the inside back piece. The darts at the front of the arm are shown.

Make any necessary adjustments, machine the front arm panel in place, and machine down any remaining raw edges.

Finish the other arm similarly. Time is saved if both arms are fitted together, and the chance of making two pieces to fit the one arm is lessened.

5. Fitting the Seat and Front Seat Band

The rectangle of material for the seat is cut with 4in. to 6in. tuck-in allowances at the back and sides, and a 1in. to 2in. seam allowance in front. If the chair is similar to the one illustrated, cut a rectangle about 3in. wider than the width of the front edge of the chair. This allows sufficient material for the tuck-in between the seat and arms.

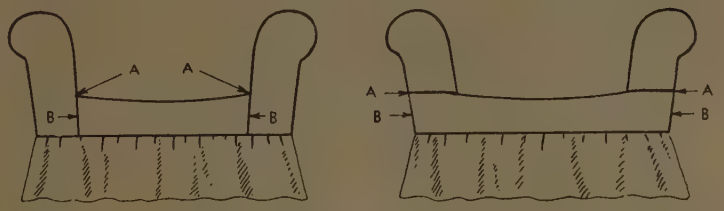
The width of the front band will depend on the construction of the chair. It may, as in the chair illustrated, reach the full width of the chair and round each side to the point where the arms meet the seat, or it may reach across only from one front arm panel to the other (see diagram at upper right).

Measure the desired depth and width of the panel. It should generally not be less than 5in. deep if it is to retain a pleasing appearance and be in proportion with the rest of the chair. Seam allowances of 1in. to 2in. top and bottom and up to 3in. to 4in. at each edge, depending on the construction of the chair, should also be made.

If the chair to be covered is similar to the one illustrated, it is necessary to cut and face the material to obtain a good fit around the front arm panel. Mark and cut along the line where the seat crosses the front arm panel and leave a seam allowance of about 2in. (that is, if the distance from the arm panel to the front seat edge is 3in., the cut will be made at a point 6in. from the raw edge of the material). A 1in. seam allowance is left on the front edge.

Be careful not to make this cut too deep. It should be 1in. to 1½in. shorter than the distance across the front arm panel. The cut is faced with a straight strip of material 3in. to 4in. wide which forms the tuck-in allowance to hold the cover in position at this point. Raw edges can be turned down and machine hemmed. The tuck-in allowance round the sides and back of the chair seat is turned under and machined.

Return the seat cover to the chair inside out and pin it to the front band. Remove the cover from the chair, insert cording, and machine the two pieces together. In the chair illustrated and in all chairs where the seat is independently sprung the outside edges of the front band are machined to the tuck-in allowance of the seat (in this case to the facing inserted in the cut made to fit around the arm), a plain seam being used; that is, cording is finished off neatly and tucked into the seam at each top corner (see diagram below).



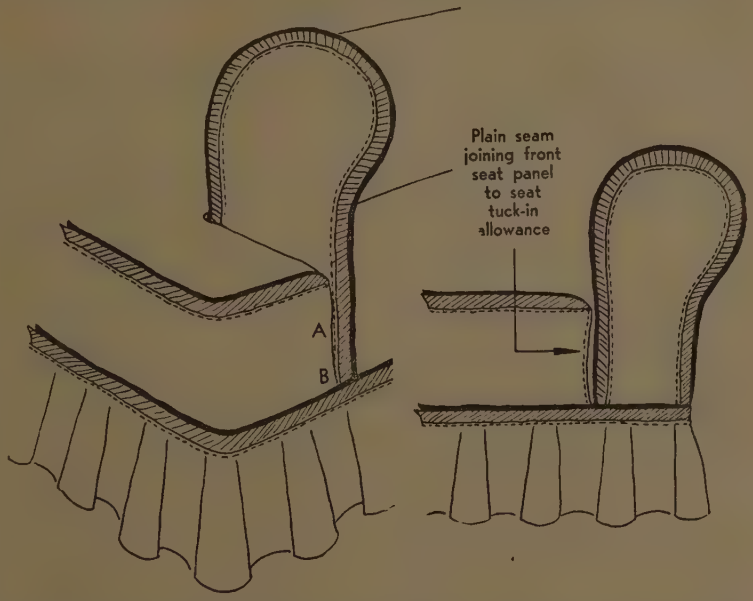
Alternative ways of arranging the arm panels and front band. When tacking leave sufficient cord at A to be inserted in the front band seam at B.

Finish the seat section by machining the raw edge at the bottom of the front band. Like the other sections it should be long enough to be tacked to the wooden frame of the chair.

6. Making the Valance or Pleated Skirt

The valance should generally be about 8in. deep when completed and should clear the floor by ½in. to 1in. Decide on a suitable depth and measure accurately the distance round the chair at the point where the valance is to be attached. Decide whether it is to be pleated or gathered, and if it is to be pleated, the spacing of the pleats and their depth. Box pleats 2in. across (each pleat therefore requires 4in. of material) are used in the chair illustrated and are spaced 6in. apart. From this calculate the number of strips of material 30in. or 48in. wide that will be needed. Their depth will be that of the finished valance plus 2in. to 3in. for seams.

Hem the bottom edge. Mark and pin the pleats in position and pin or tack the piping to the seamline on the right side of the material, raw edges together, ensuring that it is perfectly straight. Using a zipper or cording foot in the sewing machine, stitch the cording to the valance. If desired, and to prevent fraying and to strengthen the seam, another line of stitching ½in. nearer the edge may be made. Turn



Method of finishing off the cording when the front of the chair seat is sprung independently of the front arm panels. (Two types of chairs are illustrated.) In the left-hand diagram the front band may be slip-stitched to the arm pieces at the line AB to give a firm, neat finish.

The Albion Line Clipper "Dunedin" which carried the first refrigerated cargo from New Zealand to London in February, 1882.

You live by the sea

Your home may not be in sight of salt water. Nevertheless you live by the sea, as does every member of an island race. For the magic which transforms your wool and meat and dairy products into steel and hardware, motors and machinery, oils and tobacco, fertilisers and chemicals—that is the magic of the sea. . . .

Back in 1872, a group of people in New Zealand looked into the future. They saw a growing world demand for New Zealand products. They saw a growing need by New Zealand for Manufactured goods. They saw that New Zealand must have, not just ships, but a regular unfailing shipping link with the world overseas. And they founded the New Zealand Shipping Company.

Its beginnings were small, but New Zealand developed fast.

Other shipping lines appeared, operating in some cases only when freights were plentiful, skimming the cream and leaving the residue. Such competition, however, uncontrolled and unrestricted quickly created problems for both shippers and shipowners.

In the common interest some measure of co-ordination was clearly essential; and out of that necessity came the organisation later to be known as the New Zealand Conference.

It is nothing more and nothing less than a Conference of separate entities, each with its own ships, its own methods, its own traditions of service. But they have some things in common and most important of these is the determination to see that New Zealand has always the shipping link with the world which the country needs.

And, if you still call that a 'monopoly', ask yourself this question: How else could New Zealand have the benefit in good times and bad of the greatest volume of highly-specialised refrigerated tonnage in the world, running to all intents and purposes, as far as New Zealand is concerned, as one fleet and capable of handling seasonal peaks of dairy produce, wool, meat and fruit month in and month out? How else could her producers have the advantage of freight rates which can be known in advance and stabilised for long periods ahead?

How else?

Issued in the interests of mutual understanding by

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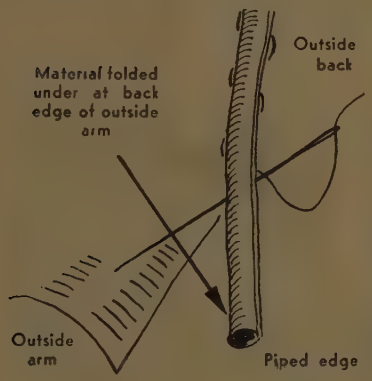
under and hem the raw edges or selvedges at each end of the valance.

Putting the Cover on the Chair

1. Back: Fit the back piece smoothly on the chair and push the tuck-in in place with a wooden spoon. A short piece of thin dowelling threaded through the bottom hem may help to keep it anchored more firmly. Tack the lower edge to the underside of the chair frame with three or four upholstery tacks only, and do not knock them completely into the chair, so that they may easily be removed later. Tuck the arm bias extensions securely out of sight.

2. Arms: Fit the arms smoothly on the chair. Tuck in the bias extensions and at the point where the arm roll merges into the back of the chair turn under the material and slip-stitch it neatly to the chair back. Fold under the back edge of the outside arm and continue slip-stitching it to the outside back down to the bottom of the chair (see diagram below).

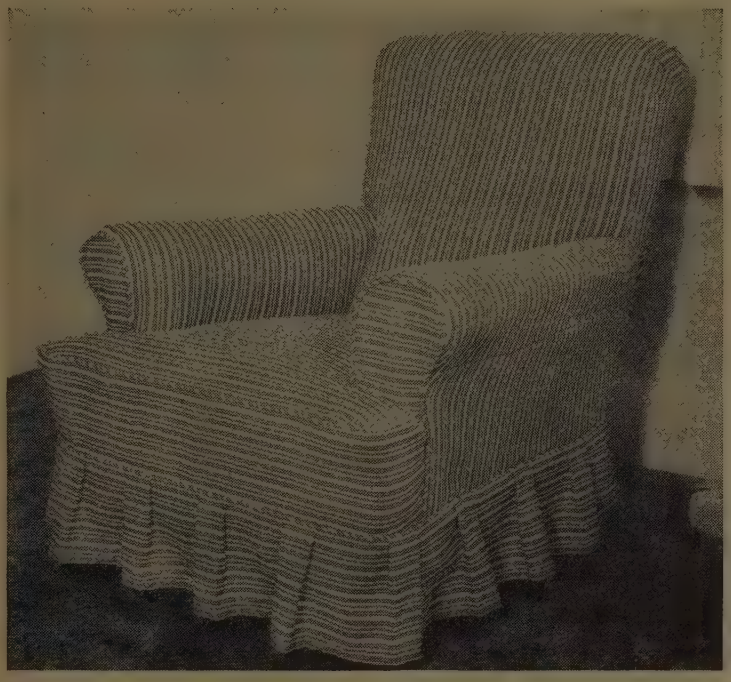


Fitting the arm on the back.

Push the inside arm tuck-in firmly in place and anchor the outside arms under the chair with two or three tacks.

3. Seat: Push the tuck-ins firmly into place and tack down the bottom edge of the front band at each corner and at two or three places along the front of the chair. Pull the band down firmly before tacking it.

In the majority of chairs the inside edge of the front arm panel, which is corded, is continued down and joins the seat tuck-in well below the level of the seat. When the independent arm and seat pieces are pushed down—the back of a large comb makes a useful pusher—they fit neatly and firmly in place. In the chair illustrated the same procedure is followed; the facing joined to the front seat panel on either side should hold the panel neatly in place, but if necessary, the bottom 2in. or 3in. can be turned under and slip-stitched to the corded seam joining the outside arm and front arm panel (see lower diagram on page 637, the line AB).



A chair with a completed five-part cover.

Last, the valance or flounce is put on the chair. There is normally no strain on any part of this section, so that it only needs to be anchored sufficiently to keep it in place on the five-part cover. In the one-piece cover it is prepared in exactly the same way, but is machined in place all the way round.

In the five-piece cover it may be anchored to the frame with tacks hammered through the seam allowance (so that the cover falls down over them and they do not show) at wide intervals, or, especially along the front edge, by slip-stitching it to the main part of the cover, using long stitches and strong thread. This may sound rather insecure, but it is quite secure —unless there is a possibility that it may be tugged and pulled vigorously by small children and playful pups or kittens. In fact those seamstresses who have difficulty in machining a straight seam may find it much easier to obtain a trim, professional appearance by this method than by machining.

This cover does, of course, take longer to pull on and off the chair, the slip-stitching necessary to join the two back seams and, if desired, where the valance joints the front band being the longest tasks, but it should not take more than ¾ of an hour. The cover, being in several parts, is easy to iron either on or off the chair. The valance, of course, must be ironed before it is replaced.

One-piece Cover

If a one-piece cover is desired, the methods of cutting, fitting, and construction are much the same, except that more generous seam allowances —of 2in. or more if the chair seems to warrant it—are left on the curved section where the inside arm meets the inside back. Pieces can be put together in a great variety of ways, depending on whether the maker starts with the seat, the arms, or the back. However, the following method—which follows the same order as that used for the five-part cover—has been found quite convenient.

1. Join the inside and outside backs together. Leave raw edges at the curves where the back pieces meet the inside and outside arms and leave the piping cord loose on the side later to be machined to the outside arm.

The other back edge has to be left open for a placket, and the cording should be stitched to the back edge all the way down.

2. Join the inside and outside arms and fit the front arm panel.

3. Join the inside arms to the inside back on each side. This seam must be fitted carefully if the cover is not to pull out of shape and tear at this point. Put the two pieces on the chair, tuck in the raw edges along the line where the inside of the arm meets the back, and mark carefully on each piece with pins or chalk the point where they meet. Take the cover off the chair, lay the two pieces right sides together, matching the lines already marked, and starting at the bottom draw another line about an inch (or more if the space between the arm and back seems to warrant it) nearer the raw edge. Curve this line out gradually until it follows exactly the fitting line at the point on the top of the arm where there is no room to tuck in surplus material. Stitch firmly along this line. This allows for ease and gives the cover a neater appearance and helps it to stay in position more easily, as when it is finished it tucks neatly in place between the arm and back. Machine the outside arm to the outside back, inserting the cording at the same time on the side that is not to have a placket.

Join the seat and front band, put the pieces on the chair, and note where the tuck-ins for the back, seat, and arms should be joined together. Mark the positions for joins at each side in front and at the centre back, as unless special precautions have been taken from the beginning, the tuck-in allowances for the arms, seat sides, back, and seat back may not be the same length.

If this is so, match them at the front and centre back and take in any extra material in the seat section as tucks in each back corner. They will be out of sight. Make the valance, insert the piping, and stitch it to the bottom of the chair cover. Insert tapes about 3in. from each corner to tie under the chair and help hold the cover in place. Finish the placket with a zip fastener or hooks and eyes, or simply slip-stitch it in place.

Extra Arm Covers

It is well worth planning to buy extra material to make two covers to fit over the front and top of each arm. Four front arm panels are cut instead of two, two being shorter and reaching barely to the point where the arm meets the seat. Two rectangles, in length equal to the distance round the curved portion of the spare front arm panels and in width equal to about three-quarters of the length of the arm, are cut out and stitched on to the front arm panels, and the raw edges are hemmed down.

These covers should fit smoothly on the arms. They help prevent soiling and greatly increase the life of the proper cover, as the top of the arms usually wears out long before the rest of the cover.

In addition, they may be very quickly and easily slipped off if desired when guests are expected.

Home-made Pectin Extract

By DAPHNE EILERS,
formerly Field Officer in Rural Sociology, Department of Agriculture, Auckland

FOR addition to jam or jelly made from fruit deficient in pectin it is useful to make an extract of pectin from other fruit which has a high content of it.

THE methods described here are both simple and are of great help in setting jams made from strawberries, cherries, ripe apricots, or pineapple.

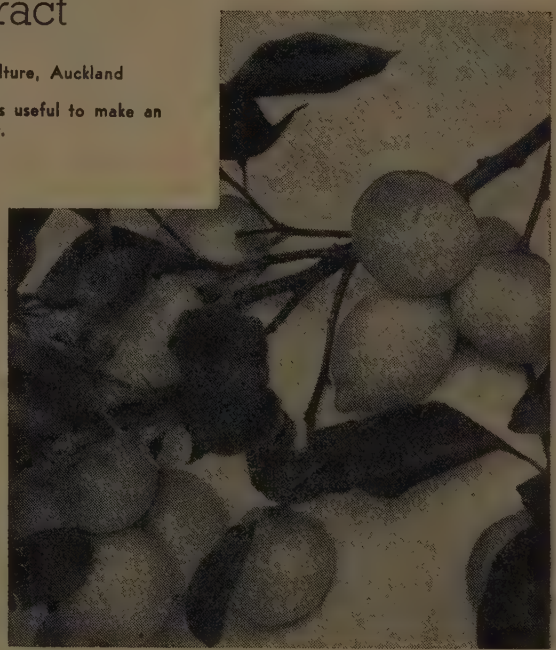
To Extract Pectin

Stock from apples, red currants, or gooseberries: Cut up the fruit and put it into a preserving pan with sufficient water to cover it (2 to 3 pints of water to 4lb. of fruit) and simmer the mixture for about 1 hour. Strain it through a jelly bag and then bring the juice to the boil, pour the hot juice into heated preserving jars, seal the jars, and immerse them in a pan of hot water. Bring the water to boiling point and boil it for 5 minutes.

Extract from citrus fruit: The following ingredients are required:—

½lb. of white membrane of oranges and lemons or grapefruit	3 tablespoons of lemon juice
	6 cups of water

Grate or pare the outer, yellow rind of the fruit. Remove the white membrane of pith and mince this. To the minced pith add the water and lemon juice and allow the mixture to stand overnight. Next day heat the mixture to boiling point and again allow it to stand overnight. Again bring it to the boil and boil it for 15 to 20 minutes; then strain it. There should be now about 2 cups of liquid. If there is more, it should be boiled to evaporate some of the water. Pour the two cups of liquid into a hot, sterilised jar and seal and process the jar for 5 minutes in a water bath. Store the jar in a cool place.



To use this pectin extract test the juice or jam to which it is to be added for its pectin content and add pectin accordingly. The amount may vary from 1 tablespoon to 1 cup, according to the pectin content of the fruit.

Pectin Test

Place a teaspoon of the fruit pulp or juice in a small glass and let it cool. To this add 1 teaspoon of methylated spirit. A firm clot shows a high pectin content. A weak clot which breaks readily shows, low pectin; no clot at all shows an absence of pectin.

A Poultry Party

SOME of the numerous and interesting ways in which poultry can be served were shown during the 1956 conference of the Canterbury-Westland Registered Poultry Keepers' Association in Christchurch when members and their guests attended a function which combined a social evening and poultry dinner.

A LARGE gathering in a Christchurch restaurant saw the restaurant manager and his assistants produce with what appeared to be magical speed beautifully prepared poultry dishes and their accompaniments. A long buffet table was transformed by a spectacular array which would delight the eye and palate of any gourmet.

A quick view of the buffet before the guests began sampling showed many varieties of chicken dishes such as soup, Maryland fried, curried with a rice border, grilled on pineapple rings, croquettes attractively garnished with gherkins and cherries, cold portions wrapped in thinly sliced ham or served with egg sauce, an imposing galantine glazed and garnished, braised, patties, and savoury eclairs. Accompaniments such as potato salad, french fried potatoes, asparagus tips, celery curls, and stuffed eggs were also served.

Some of the dishes were less easily recognised, the recipes having been acquired by the restaurant manager during his experience in many parts of the world. In an interview he explained the methods of preparation of some of the more unusual ones. He added that a little wine, preferably Bordeaux, will enhance the flavour of any chicken.

[*Weigel*

A Hawaiian Chicken Dish

One of the dishes which originated in Hawaii was named "Princess Kaiulani", after a lovely princess who was heir apparent to the throne of Hawaii. The dish, which was created in her honour, is comprised of braised chicken and braised ham or wild pig steaks. When the braised chicken and the ham are nearly cooked 1 cup of desiccated coconut is added. Then one cup of rich cream is stirred in very, very slowly. Finally, 4 or 5 peppercorns are added and the whole braised for a further 10 minutes.

Mo Go Guy Pan

A sweet-sour Cantonese dish, mo go guy pan is made from breast of chicken, vegetables, and pineapple juice. The chicken is first partly cooked and the breast sliced very thinly. Portions of cabbage, celery, carrot, and lettuce are very thinly shredded, sauted in a little oil, then braised with the addition of pineapple juice. The sliced breast of chicken is added to the vegetables and the whole covered and simmered very slowly for 1¾ hours.

German Chicken Fricassee

For German chicken fricassee the chicken is cut into portions and boiled, preferably in a shallow pan. The stock is then thickened with a little flour. Salt and pepper are added to taste and 2 knobs of butter. Then the juice of 3 lemons, 1 hard-boiled egg finely chopped (yolk and white), and ½ cup of seeded raisins are stirred in. The dish is then heated and served at once with a border of boiled rice.

Successful Experiment

This culinary experiment showed clearly that the quality of poultry produced by poultry keepers and redistributed through New Zealand markets is now of a high standard. Guess-work is eliminated by a system of labelling and the housewife need no longer wonder whether she is buying a roaster or a boiler. It also showed that with imagination poultry may be served in many ways and with a great variety of flavours.

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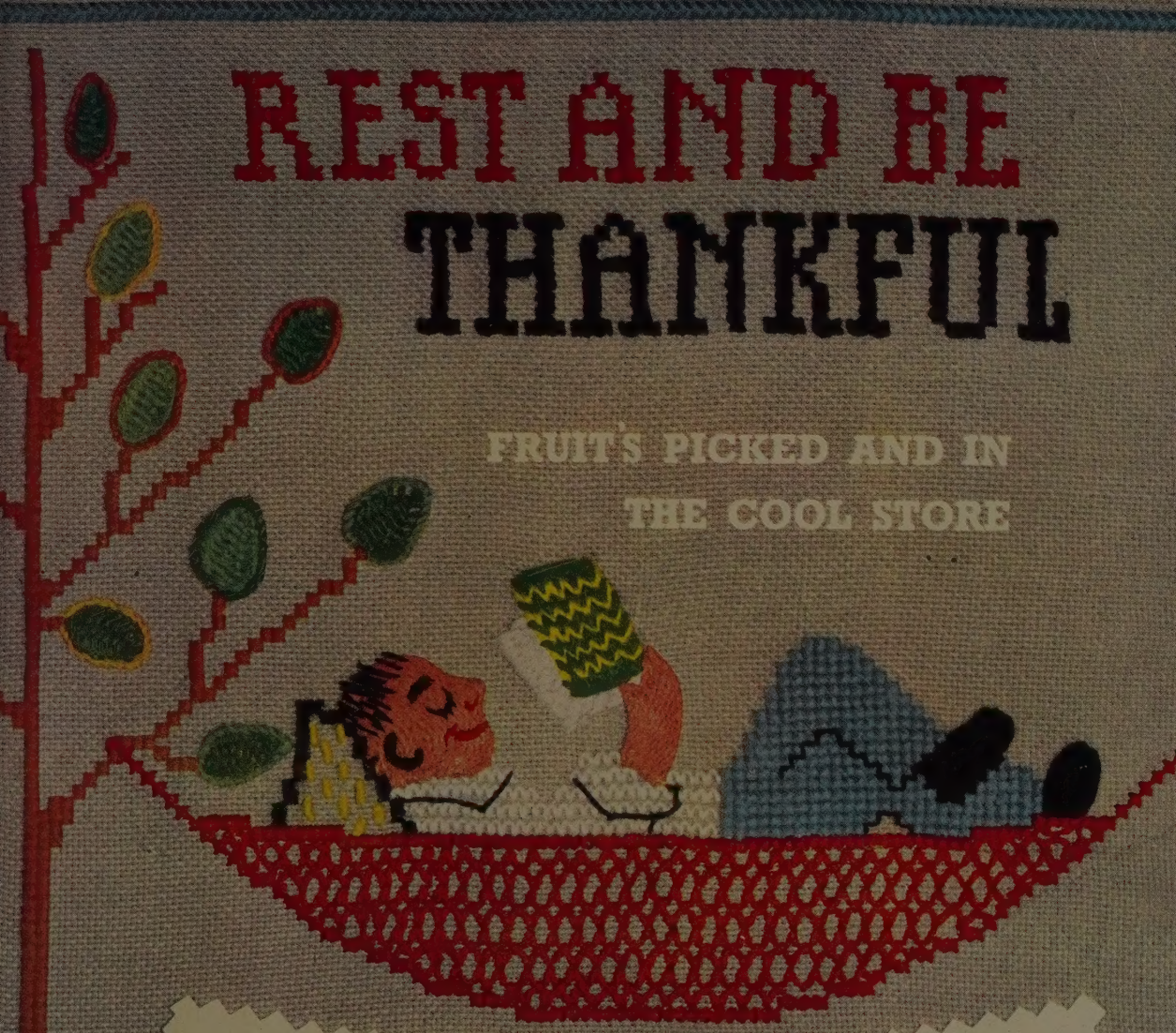

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If you are still operating without the safeguard and pleasure of a Westinghouse Cool Store in your orchard, write NOW for a free inspection and quotation. No obligation. *Orchardists with cool stores have more time for rest and recreation.*

PAYS FOR ITSELF

A Westinghouse Recold Cool Store costs far less than most orchardists think! Existing sheds can be converted. Once installed your cool store pays for itself by saving wastage, getting higher prices for produce.

Write to

H. W. CLARKE (N.Z.) LTD.

42-46 Cable St., Wellington who will instruct a Westinghouse Engineer to visit your orchard and submit a free quotation.

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